JANUARY 1952 Volume 67 Number 1

PUBLIC HEALTH REPORTS

In this issue

APHA, San Francisco
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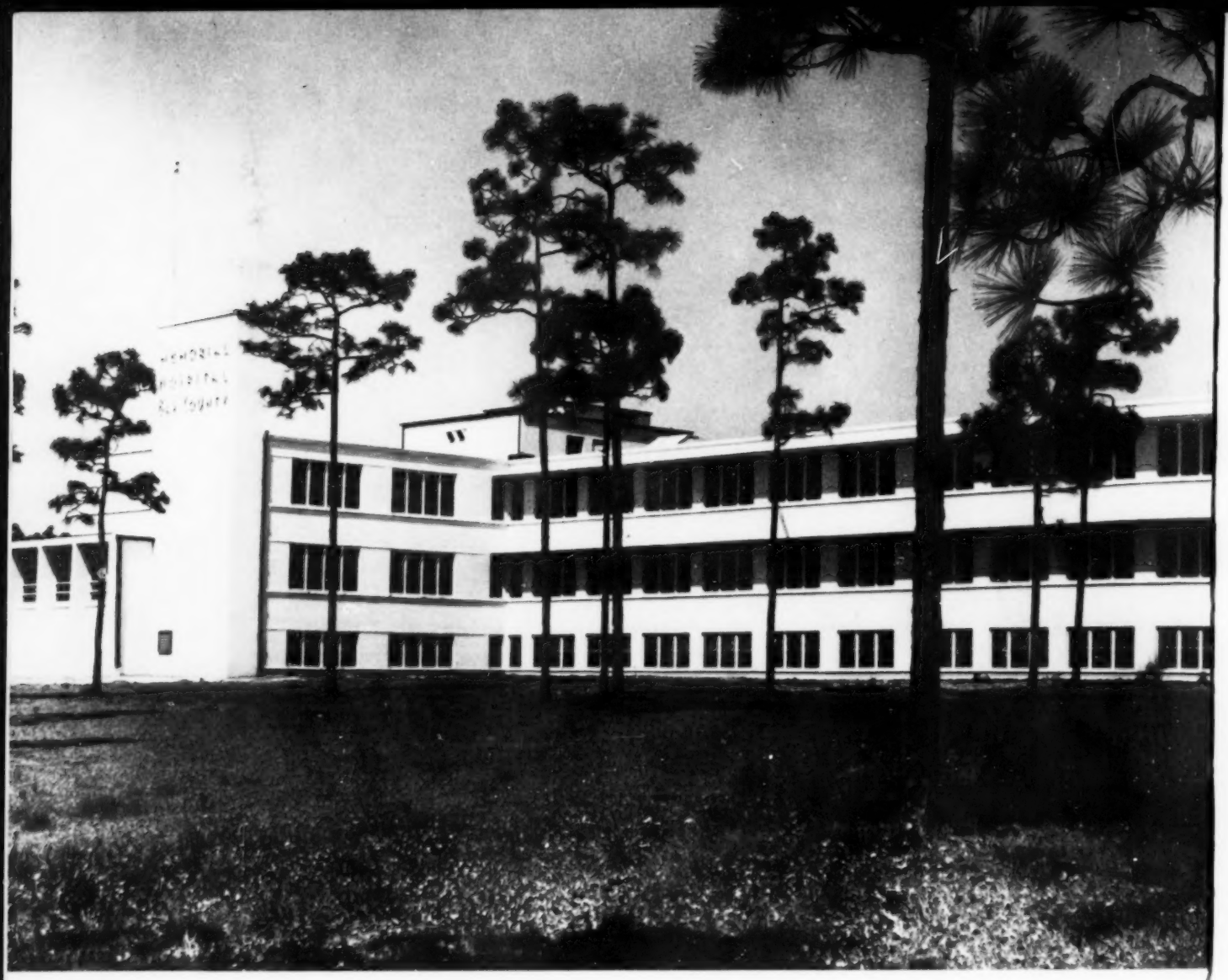
FEDERAL SECURITY AGENCY • PUBLIC HEALTH SERVICE



Under the Hospital Survey and Construction (Hill-Burton) Act more than 1,700 hospital and health center projects have been approved by the States and the Public Health Service. Nearly 800 are now in operation. About 80 percent of the approved projects are located in rural areas where adequate hospital services have not been available to the people before. This is the Bay County Hospital at Panama City, Florida.

January 1952

Volume 67
Number 1

PUBLIC HEALTH REPORTS

Published since 1878

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PUBLIC HEALTH REPORTS

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NOTICE TO READERS

Free subscriptions to the NEW MONTHLY *Public Health Reports* will be available for official use to the following groups:

State health agencies, including mental health, water pollution, occupational health, and related activities which may not be part of the health department.

Local health departments—State, district, county, city.

Medical care institutions, including major hospitals and medical centers (directors, libraries).

Voluntary health agencies (national offices and major affiliates).

Foundations and research institutions in the health field (directors and libraries).

Professional societies and associations in the health field (national offices and libraries).

State departments of welfare, labor, education; commissions on aging (directors).

Professional schools accredited to train health personnel (deans, professors of preventive medicine, libraries).

Foreign and international agencies dealing with health programs (health program directors and libraries).

Federal Government agencies with health programs (program directors and libraries).

General university and college libraries, and major public libraries.

The number of copies of each issue of the new *Public Health Reports* which can be distributed free of charge is sharply limited by funds, law, and stipulations of the Bureau of the Budget.

We would like to be able to furnish free copies of the new *Public Health Reports* to all the many individual health workers who have been receiving personal copies of the former periodicals. Unfortunately, we cannot. However, within limitations on the number of free copies, we shall make every effort to furnish the new *Public Health Reports* to representative organizations in health, welfare, and related fields, as listed above. We hope these organizations will work out ways of circulating the monthly issues widely among their staffs, and that the issues will be placed in libraries or a central office where they will be available.

If you feel that the new *Public Health Reports* is essential to your work, and if you think you may not be able to get it through your organization, you can request to be placed on the free mailing list.

Please complete the application form on the reverse of this page and send it—as soon as possible—to the Surgeon General, Public Health Service, Washington 25, D. C. Your application will receive every consideration.

The new *Public Health Reports* will be available by paid subscription from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at an annual rate of $4.25, domestic; $5.00, foreign.

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1. Which of the four Public Health Service periodicals have you been receiving?

   ☐ PUBLIC HEALTH REPORTS (weekly)

   ☐ EXTRACTS from PHR on TUBERCULOSIS CONTROL (monthly)

   ☐ JOURNAL OF VENEREAL DISEASE INFORMATION (monthly)

   ☐ CDC BULLETIN (monthly)

2. Are you the only reader of your copy?
   If not, how many and what kinds of health workers share it?

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3. Is there a reference library of health periodicals available to you?
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*In general, the addresses prepared for mailing the *Public Health Reports* will bear the position of the recipient rather than his name.

PUBLIC HEALTH REPORTS

From Yellow Fever to International Health

Public Health Reports had its modest beginning in a one-page "Bulletin" issued on July 13, 1878, by the Supervising Surgeon-General of the Marine-Hospital Service.

Two months earlier, Congress, hoping to fend from American shores the twin scourges of cholera and yellow fever, had passed the first National Quarantine Act. This law required American consuls to file reports on sanitary conditions abroad and on vessels leaving infected foreign ports bound for the United States. From these reports and "other pertinent information" the Surgeon-General was to prepare weekly abstracts for transmission to medical officers of the Marine-Hospital Service, to collectors of customs, and to the State and municipal health authorities in the United States.

BULLETINS.

No. 1.

OFFICE SURGEON-GENERAL, U. S. M. H. S.,
Washington, July 13, 1878.

The following information is furnished by the Surgeon-General of the Marine-Hospital Service to State and municipal officers of health, &c., in accordance with the requirements of the National Quarantine act:

Havana, Cuba.—From 20 to 34 deaths from yellow-fever, and more from small-pox, are now occurring weekly in the city of Havana.

Cardenas and Sagua la Grande, Cuba.—Good health in bay and city.

Matanzas, Cuba.—The captain and four of the crew of the bark "Marie Donau" were attacked with yellow-fever on the 3d instant, in the harbor of Matanzas. Only one other case of fever has occurred in the shipping of that port. Sporadic cases are reported in the city, but the disease is of a mild character.

Key West, Fla.—Two cases of yellow-fever have occurred in the harbor of Key West, one on the Norwegian ship "Marie Frederike," and one on the Spanish bark "Dofia Talefora." The city is reported healthy.

Two of the British vessels which recently conveyed native Indian troops to Malta, had cholera on board during the passage from India. On one of the vessels nine cases and four deaths, and on the other two deaths, occurred before the vessel passed the Suez canal. The vessels were allowed to pass the canal without detention, though it is customary to send a vessel, on which a single case of cholera has occurred during the voyage, back to Thor, 120 miles, there to remain two weeks or more in quarantine.

JNO. M. WOODWORTH,
Surgeon-General, U. S. M. H. S.

1881 Reprint of the First *Bulletin*

The early bulletins, though brief, were grim enough to arrest any reader's attention. Bulletin No. 3 (July 27, 1878) led off with the ominous words, "About the 12th instant, cases of yellow fever began to occur in New Orleans." Thus began the stark record of the great Mississippi Valley epidemic that claimed 20,000 lives. Upstream sped the disease, while authorities tried hopefully but futilely to kill it with carbolic acid—upriver to Vicksburg, to Port Gibson, to Grenada, to Louisville and Cincinnati and as far as Pittsburgh, where a dying steamboatman was carried ashore from the *John D. Porter*, the ill-fated sternwheeler which had left an infected wake for one thousand miles.

The tragic story is tersely told in volume I of the *Bulletins of the Public Health*, and between its laconic lines may be read both terror and heroism. In August, Dr. Booth, in charge of the Marine-Hospital Service at Vicksburg—where 20 deaths had just been recorded from yellow fever in 24 hours—telegraphed, "I am sick; impossible to procure accurate data." The next *Bulletin* recorded his death.

Yellow fever . . . the Marine-Hospital Service . . . a feeble quarantine act . . . the very terms and conditions of that time recall the sweeping progress in public health since 1878. That progress can be symbolized by the transformation of the *Bulletin*, with its meager abstracts tracing the course of seemingly invincible diseases, to the new *Public Health Reports*, a forum for the thousands of

The New Public Health Reports

The new *Public Health Reports* carries forward a record of service extending from 1878.

The amalgamation, in the present journal, of several other Public Health Service technical periodicals represents, we believe, a strengthening and revitalizing of the *Reports*.

It is, moreover, an attempt to reflect the changing—and broadening—concepts of public health which have been emerging during the past decade.

In 1878, when *Public Health Reports* was founded, its primary function was to carry out the Service's responsibility for compiling and publishing data useful in combating epidemics.

Today, public health responsibility embraces such varied and complex fields as basic research, the problems of the aging, rehabilitation, and hospital construction—in addition to the control of epidemic diseases and the fight against the venereal diseases and tuberculosis.

It is our hope that the new *Public Health Reports* will be a useful and challenging source of information for all who are working in this field. The new monthly journal will focus primarily on public health practice, health service administration, and on research in these fields. It will be concerned largely with those aspects of public health which touch upon the work of the official agencies.

We hope that, as time goes on, it will become a real forum for the exchange of professional ideas and a stimulus toward new and better concepts of public health practice.

To aid in the development of the editorial standards and policies, a Board of Editors has been named. The board is made up of individuals of experience and wisdom in various public health fields. We shall rely heavily upon them and upon our editorial consultants, to whom will fall the task of reviewing manuscripts. I am deeply appreciative of their willingness to aid us in the development of the journal.

The pages of the new *Public Health Reports*, like those of its predecessors, will be open to responsible authors, outside as well as within the Federal service, in the United States as well as abroad.

With this issue—No. 1 of volume 67—*Public Health Reports* turns another page in its long career. Its usefulness, as in the past, will depend upon how well it meets the needs of its readers.

We are relying upon you, as well as upon our Board of Editors and the staff, for contributions and for the kind of constructive criticism which is essential to the growth and development of any publication, new or old.

LEONARD A. SCHEELE, M. D.
Surgeon General

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professional and technical workers who are marking up steady advances in a concerted drive to improve the Nation's health. Through the 65 intervening volumes runs the record of the public health movement in the United States—a record of its frustrations and dead ends, of its many victories, of its enduring problems.

Epidemics and Quarantines

The *Bulletins of the Public Health* expired after 46 numbers, leaving a clear field for the short-lived National Board of Health and its quarantine reports. Publication was resumed in 1887, however, when No. 47 came off the press as the *Weekly Abstract of Sanitary Reports*. The Division of Sanitary Reports and Statistics was responsible for the *Abstract*, and a special officer was detailed to supervise its editing and mailing. Still a bare chronicle of only a few pages, it reached 1,800 readers and was—in its editor's words—"greatly appreciated not only by quarantine officers, but steamship companies, merchants, and the press."

In recording the prevalence of communicable diseases, and little else, the *Abstract* faithfully reflected the public health functions as carried out then by the Marine-Hospital Service. The quarantine powers and duties of the Service, both interstate and foreign, were enlarged by Congressional acts of 1890 and 1893—none too soon, for there was a cholera pandemic in the

Dr. Anderson

Dr. Andrews

Dr. Dunn

Dr. Eliot

Dr. Freeman

Dr. Knutson

Gaylord W. Anderson, M. D., Dr. P. H., is director, School of Public Health, University of Minnesota, and president, American Public Health Association.

Justin M. Andrews, Sc. D., LL. D., a parasitologist of wide teaching and field experience, is in charge of the Communicable Disease Center, Public Health Service.

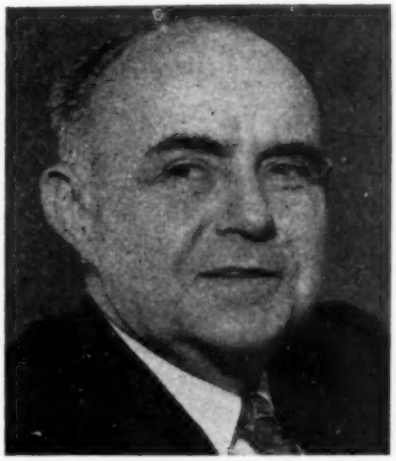
Halbert L. Dunn, M. D., Ph. D., is a member, WHO Expert Committee on Health Statistics, and chief, National Office of Vital Statistics, Public Health Service.

Martha M. Eliot, M. D., Sc. D., a pioneer in national and international programs for maternal and child health, is Chief, Children's Bureau, Federal Security Agency.

Ruth Freeman, R. N., Ed. D., is associate professor of public health administration, Johns Hopkins University, formerly Administrator of Nursing Services, American Red Cross.

John W. Knutson, D.D.S., Dr. P. H., is known for his work in preventive dentistry and is chief of the Division of Dental Public Health, Public Health Service.

The Board of Editors of Public Health Reports



Dr. McGavran

Edward G. McGavran, M.D., M.P.H., chairman of the board of editors, is dean of the University of North Carolina School of Public Health. He was in the private practice of medicine before becoming associated with the Kellogg Foundation. He has served as a local and State health officer and has taught in the medical schools of Kansas and Washington (St. Louis) universities.

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Gerard Piel, A. B., formerly science editor of *Life,* is publisher of *Scientific American.*

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Fillmore Sanford, Ph. D., a social psychologist and former professor, is executive secretary of the American Psychological Association.

George M. Uhl, M. D., M. S. P. H., health officer, Los Angeles, has been chief and assistant director, bureau of local health service, California Department of Public Health.

Russell M. Wilder, M. D., Ph. D., recently retired from the Mayo Foundation, is director of the National Institute of Arthritis and Metabolic Diseases, Public Health Service.

Dr. MacLean

Mr. Piel

Mr. Pond

Dr. Sanford

Dr. Uhl

Dr. Wilder

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latter year, and yellow fever struck in Georgia. The Service was strengthened, too, by the creation of the Commissioned Corps in 1889, providing a mobile force of doctors vested with Federal authority.

Medical research had not yet been officially delegated to the Service, but Surgeon J. J. Kinyoun in 1887 opened a one-room bacteriological laboratory in the Staten Island Marine Hospital. There its founder, after the Service in 1890 was ordered to conduct medical examinations for the Immigration Service, first detected the cholera organism among immigrants. The modest research establishment was moved to Washington in 1891, where it became known as the Hygienic Laboratory.

Kinyoun's name looms large in the volumes of the *Abstract*. He wrote its first sizable article—a 31-page essay on the Louisiana State Board of Health and its methods (following which the publication subsided to its customary four pages). His observations on Roux's serum therapy for diphtheria, at the International Congress of Hygiene and Demography in Budapest in 1894, were considered so noteworthy that they were published in the *Abstract* twice within a month.

The *Abstract* became *Public Health Reports* in 1896, but other than the title banner there was little change for several years in either format or content. Epidemics were still the major preoccupation, as public health workers applied their heritage from Pasteur, Koch, and Theobald Smith in detection and control of disease. The *Reports* indicate that an especially close watch was kept throughout the world on plague, smallpox, typhus, yellow fever, and cholera.

Near the turn of the century, yellow fever more than any other disease absorbed the energies of public health personnel. By reason of its official duties, the Marine-Hospital Service was concerned principally with the exacting task of quarantine—a task vastly expanded in magnitude by the Spanish-American War and troop movements to and from yellow fever areas. In the December 22, 1899, issue of *Public Health Reports* appeared the conclusions reached on yellow fever by the Service's investigating commission of medical officers. Their findings, the commission declared, "verify those of Sanarelli in his discovery of the *Bacillus icteroides*. They further demonstrate that this disease is received into the human system through the respiratory tract." Yet it was Surgeon Henry R. Carter of the Service who first described the extrinsic incubation period of yellow fever, a study which Walter Reed credited with pointing the way to his own epochal discovery of mosquito transmission. The same Carter was to contribute many valuable malaria studies to the *Reports* in the years that followed.

The Broadening Base of Public Health

The first two decades of the new century, culminating in the demands of World War I, saw the modern public health movement in formation. A Congressional act of 1902 changed the Marine-Hospital Service into the United States Public Health and Marine-Hospital Service, and broader responsibilities went with the new title. The Service was given regulatory control over the interstate sale of important biological products. In 1901, Congress had endowed the Service with authority and funds for "the investigation of infectious and contagious diseases and matters pertaining to the public health." From this halfway house, an advance to full-scale field and laboratory investigation was made in 1912, when what now became the Public Health Service was empowered to study not only the diseases of man but also the "conditions influencing the propagation and spread thereof," including sanitation. sewage, and water pollution.

The broadened scope of Service activities soon gave *Public Health Reports* an abundance of important and sometimes dramatic new material for publication. Packed into the fattening volumes, along with statistical reports and tables, were the observations of medical scientists and epidemiologists who were relentlessly whittling down the killing and crippling power of communicable diseases. Here, for example, were Stiles' summaries of his war against hookworm; accounts by Goldberger and Anderson of their investigations into the etiology and prevention of typhus fever; malaria control discussions by Carter and the sanitary engineer Le Prince. Here, in 1906, appeared King's report

on the experimental transmission of Rocky Mountain spotted fever by means of the tick, first in a lengthy series in which Public Health Service researchers pinpointed facts about that disease and immunization against it. Here, too, were recorded the labors of those tireless epidemiologists, Frost and Lumsden, whose work dramatized for countless communities the direct link between environmental sanitation and typhoid.

No chapter in the history of *Public Health Reports* is more fascinating than that which unraveled the mystery of pellagra. In the years before World War I, this disease was recognized as one of the Nation's great public health problems, but its etiology still baffled medical men. In the *Reports* for June 26, 1914, Goldberger, in three and one-half modest pages, advanced the suggestion that pellagra was due to dietary deficiency; and he proceeded to prove his hypothesis in subsequent institutional experiments. His work was not only decisive for the treatment and prevention of a centuries-old disease, it also convinced medical science that bacteriological considerations were not the be-all and end-all of research, and it opened the whole nutritional field which was to prove so fruitful of results.

In the *Reports* of these formative years, too, one may read the signs of a developing Federal-State-local structure for the operation of public health programs. One indication of this cooperative movement was the publication of municipal ordinances, State legislation, and court decisions affecting public health. In 1915 a model State law for morbidity reports was printed.

Along with these new features, statistics remained a vital element of *Public Health Reports*. The reason for these columns of figures was convincingly emphasized as early as 1913, when the weekly report on the prevalence of disease for the first time led off with the now-familiar admonition: "No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring."

Public Health Comes of Age

World War I made strenuous demands on the Public Health Service and local health agencies. The *Reports* reflected the conviction that physical fitness, for civilians as well as for troops, was a duty owed the Nation. This concern was strikingly shown in the increased number of articles on industrial health. The most important "sanitary problem" facing the United States, however, was the control of venereal disease. Foreshadowing the campaign of the 1930's, the Public Health Service, through its newly created Venereal Disease Division, cooperated with the States in a $1,000,000 program of prevention and control, one of its aims being the education of the public to "permit the free and frank discussion of this important question without offense to modesty."

The influenza epidemic was the regular front-page topic in 1918–19. The *Reports* noted on October 4, 1918, that the disease was spreading rapidly over the country. Soon the Service was besieged by correspondents offering "sure cures," which ranged from patent medicines to "harmonic vibrations." The epidemic left one useful legacy. It showed "better than volumes of reasoned arguments," said *Public Health Reports*, the necessity for a reserve corps of commissioned public health officers—and such a corps was created by Congressional resolution in 1918.

While the war stimulated public health organization and activity, it also revealed health conditions which were in some respects deplorable. The Service's response to this challenge was a comprehensive program, outlined in *Public Health Reports* for December 5, 1919, embracing industrial control of malaria, tuberculosis and venereal disease, improved morbidity reports, and health education.

The Public Health Service, meanwhile, was developing the role it would play as catalyst and guide for State and local programs. In the *Reports* of the early 1920's, Sydenstricker presented significant findings in the monumental Hagerstown, Md., survey of health and socio-economic status, a landmark in the study of medical care. And before the close of the decade, studies of local health work began to appear.

Medical research, understandably, continued to command many pages of the *Reports*. As microbiological investigations were carried forward, the names of novel or unusual diseases

made their appearance. Edward Francis labeled tularemia in July 1921. Others inquired into the organisms and the epidemiology of brucellosis. In the late 1930's, Q fever was identified and discussed. In the field of biologics control, investigation of vaccination sequelae began in 1925 and continued for several years, while scarlet fever serum was another topic of the mid-1920's.

A notable program development in the years between the two World Wars was the campaign against venereal disease, given its initial impetus in 1918 and brought to a well-publicized climax in a great drive 20 years later. The pressing nature of the problem was signaled by the appearance of *The Journal of Venereal Disease Information*, which began as a mimeographed abstract in 1920 and later expanded into a printed publication with original articles. The editor was the chief of the Venereal Disease Division, and such chiefs as Thomas Parran were frequently contributors as well. Throughout its 32 volumes, the *Journal* has played a stimulating part in venereal disease control, its articles recording the remarkable achievements in the field.

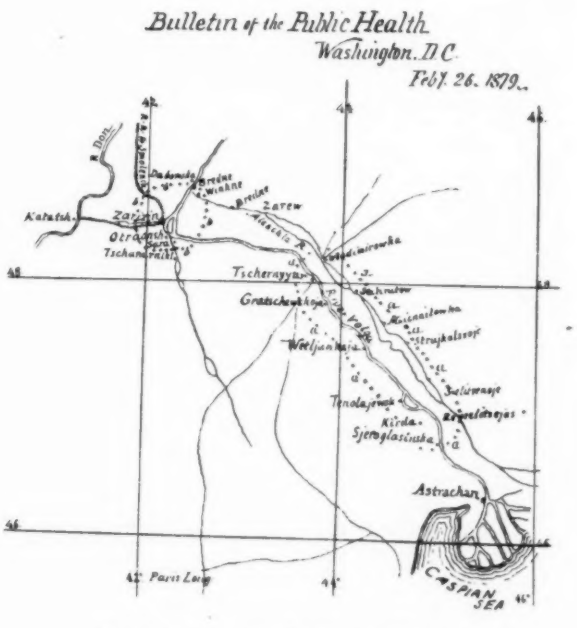
Maturity and Expansion

Viewed telescopically, the growth of the Public Health Service in the past two decades is startling, almost bewildering. Yet it is well to remember that this growth has not been haphazard but rather a logical development from the past. New programs, new organizational arms, new functions have been added to meet specific health problems or to exploit fresh opportunities. Those problems and opportunities have been discovered in the light of a steadily enlarging concept of public health—a concept that found ultimate expression in the World Health Organization's definition of health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

This developing concept may be discerned in the Social Security Act of 1935, which regularized grants-in-aid to the States, thus providing a solid base for the building of local health services and for such special programs as the care of crippled children, the improvement of maternal and child health, and tuberculosis control. Four years later the Public Health Service, after 141 years under Treasury supervision, was made a part of the new Federal Security Agency.

Another legislative landmark was the Congressional act of 1937 which authorized a National Cancer Institute and at the same time empowered the Surgeon General to provide research grants and fellowships for the study of cancer. Thus the pattern was set for the present broad research grants program; and simultaneously a beginning was made along lines which eventually brought the establishment, at Bethesda, Md., of the seven research groups of the National Institutes of Health.

Even in a brief survey, one further law deserves mention—the Hospital Survey and Construction Act of 1946, which gave the Public Health Service responsibility for a $75,000,000-a-year program of hospital construction carried out through grants to the States.



Map of the District infected by Plague.
The lines a–a. represent the military Cordon drawn around the infected villages: and b–b. the protective Cordon maintained around Zarigin,—an important Commercial point, and terminus of the Russian Rail-road system.
The village of Wetljankaja was the original and principal centre of infection

One of the First Illustrations in the Forerunner of *Public Health Reports*

Another and a tragically different stimulus to expansion was World War II, in which the contributions of the Public Health Service ranged from an intensified venereal disease control program to the recruitment of a Cadet Nurse Corps. On the industrial front, the Service developed methods which reduced TNT poisoning. Fighting men benefited by new or improved vaccines for typhus, yellow fever, and plague, by antimalarial drugs, by the Service's studies on the effects of high-altitude flying, and by the mass processing of blood to plasma in the Biologics Control Laboratory.

Among the major postwar developments was the establishment of the Environmental Health Center in Cincinnati and of the Communicable Disease Center in Atlanta, each a national headquarters for intelligence, planning, and research in its field. The Communicable Disease Center grew out of the program launched in 1942 for Malaria Control in War Areas. The attack on malaria was chronicled by its own publication, the *MCWA Field Bulletin*, which gave way in 1946 to the *CDC Bulletin*. This periodical has featured articles by scientists in the forefront of the drive against communicable diseases, as well as reports of operational and research programs in the Communicable Disease Center.

In much the same way, the postwar tuberculosis control program and the creation of the Tuberculosis Control Division in the Service gave rise to its own publication, the Tuberculosis Control Issue of *Public Health Reports*. This special monthly issue began in 1945, 2 years after editorial direction of the *Reports* was assigned to the chief of the Division of Public Health Methods in the Office of the Surgeon General. Contributions, from domestic and foreign sources, have been notable stimuli to a renewed attack on an old killer.

The amalgamation of these three technical periodicals of the Public Health Service with the weekly *Reports* to form a "new" monthly *Public Health Reports* reflects a growing realization of the practical interdependence of public health activities. The merger is a natural development, moreover, at a time when the great problems and even greater opportunities in public health require an integrated and flexible Public Health Service. Such terms as ACTH and cortisone, arctic health and world health, fluoridation, biological warfare, and radiological protection are reminders of how wide-ranging and adaptable the Public Health Service must be.

The Public Health Service has come a long way since that day in 1878 when the dying Dr. Booth sent his pathetic telegram, "I am sick; impossible to procure accurate data." Yet Booth is part of an enduring tradition, for the assembling and dissemination of data is the very basis of effective public health work. That tradition the new *Public Health Reports* will keep alive.

Scheduled For Early Publication

Aging: Its Implications for Public Health.—An over-view of the problem, by Clark Tibbitts, plus briefs of more than two dozen papers presented at the Second International Gerontological Congress.

Definitions and Functions: The Health Department's Dilemma—An examination of the changing role and expanding responsibilities of the modern public health department, by Joseph W. Mountin.

Research for Improved Nursing Practice—A discussion of current needs and developments in a field that requires increased attention, by Lucile Petry, Margaret Arnstein, and Pearl McIver.

50th Conference of State and Territorial Health Officers.—Shortened texts and reports of the major papers presented before the health, hospital planning and construction, and mental health authorities of the Nation.

Research in the Epidemiology of Mental Illness—A review of current projects and emerging needs, by Robert H. Felix and Morton Kramer.

The CMP and the Public's Health

By W. E. GILBERTSON, B. S. E. E., M. P. H.

How will the Controlled Materials Plan affect health and medical care facilities?

What's ahead in 1952?

What is the expected level of hospital and health facility construction?

Will there be a sufficiency of health and medical equipment and supplies?

Can we maintain our standards of medical care?

Defense Mobilization

Immediately following Korea, our Nation decided to step military defenses up to the brink of constant preparedness—a policy designed to protect the United States from the imminence of aggression. The Congress passed the Defense Production Act on September 8, 1950, giving the President emergency powers to allocate materials and facilities "in such manner, upon such conditions, and to such extent" as he deemed "necessary and appropriate to promote the national defense." The language of the act was simple but the decisions to follow were to be the difficult ones of gearing for war—and ones of far-reaching significance to public health.

Public Health and the Defense Program

Late in 1950, the Federal Security Agency was designated a "claimant agency" with jurisdiction over health, education, welfare, recreation, and sanitation programs (with the exception of water supply and sewage disposal). The Federal Security Agency then delegated to the Public Health Service responsibility for the claimant program of estimating and presenting to appropriate authorities the requirements of the health and medical segment of the national economy. This is the first time the Public Health Service has been called on to perform such a function. During World War II all claimant responsibilities were confined to the War Production Board.

Mr. Gilbertson, who is chief of the Division of Civilian Health Requirements, Office of the Surgeon General, was formerly executive officer for the Public Health Service's Communicable Disease Center in Atlanta.

New hospital construction means large quantities of controlled materials—Steel, Copper, Aluminum.

Control of production for defense is divided between the over-all planning organization of the Defense Production Administration and its sister operating agency, the National Production Authority. Twenty government agencies, in addition to the Federal Security Agency, and 35 industry divisions in the National Production Authority represent particular segments of the national economy as claimants.

The claimant agency program for health combines a double responsibility: first, the authorization for construction of all civilian hospitals and health facilities applying under the Controlled Materials Plan with corollary allotments of controlled materials by calendar quarters for each project approved; and second, analysis of the domestic distribution of health and medical supplies and equipment to the

civilian population. The Public Health Service health facility program does not include construction of military or Veterans Administration hospitals.

What Is The Controlled Materials Plan?

The Controlled Materials Plan—CMP—is based on World War II experience, and CMP can best be described as the theory of balancing supply and demand within the available resources of steel, copper, and aluminum.

CMP places production responsibility on a prime contractor in terms of end products to be produced at a given time, in a given quantity. In health facility construction, for example, the prime contractor would be the principal contractor for a hospital, or in the manufacture of health and medical equipment and supplies, he might be the manufacturer of X-ray machines. The prime contractor passes on authorized construction (or production) schedules to the subcontractors supporting him. Allotment of controlled materials is by weight, in such forms as they are produced at the mills—sheets, plates, tubes, bars, angles, and others. There are certain civilian-type end products not lending themselves to a vertical type of handling which are allotted by dollar value through the issuance of priority ratings for their purchase. In hospital and health facility construction, examples of these products would be lighting fixtures, metal sash and doors, and mechanical equipment.

Civilian Health Requirements

To discharge public health claimant responsibilities, the Division of Civilian Health Requirements was created in the Public Health Service and staffed with public health personnel experienced in World War II procurement and hospital construction.

One of the initial steps taken by the new Public Health Service division before CMP was to prepare long-range estimates of expected consumption or use for more than 1,100 products and for the quantities of materials urgently needed for new and under-way construction. Expansion of productive capacity was urged wherever study revealed that critical shortages of health and medical supplies and equipment might be encountered.

Under the Controlled Materials Plan, the Division of Civilian Health Requirements receives from the Defense Production Administration quarterly allocations of controlled materials for the construction of health facilities, including hospitals, health research activities, health centers, group practice clinics, convalescent homes providing medical care, nurses' residences, and refuse disposal systems for public use. The division allots metals from its quarterly CMP bank of materials by issuing authorizations permitting eligible projects to draw on approved amounts of materials. Issuance of allotments to individual projects follows careful screening for essentiality.

Today, all uses of critical materials demand careful examination. Why is construction of this hospital required? Can it be deferred for 6 months? For a year? Have financing arrangements been completed? Can the project be staffed upon its completion? Are there enough doctors available? Nurses? Where is it located? What is its relationship to the defense effort?

The answers to these and similar questions provide a basis for examination of proposals for health-type construction, and simply mean that new hospitals not urgently needed may have to be deferred. All health facility projects are ranked according to essentiality. Under the Public Health Service plan for screening projects, proposals for hospital construction receive first consideration if the new facility will maintain or add beds in critical defense areas or in defense-impacted communities where the need is urgent. Second priority is given to localities having no hospitals within reasonable traveling distance. Then there are areas with descending degrees of hospital bed shortages. Similar criteria of essentiality are used for classifying proposals for other types of health facilities.

CMP and Health Facilities

To consider how the operation of CMP will affect our standards of medical care and how it will affect hospitals and other health facilities, varying factors must be weighed carefully:

1. A comparison of the current rate of new construction with the recent past. 2. A comparison of estimated metals requirements for public health construction with the metals allocations received under CMP. 3. The relationship of the current rate of construction to unsatisfied needs. 4. Future trends, using the limited experience of the first two quarters of operation under the Controlled Materials Plan as the basis for prognostication.

Accurate figures on the completion rate of new hospital beds in the decade from 1930 through 1939 have been difficult to obtain (see chart). The best estimates available show that the yearly average provided an additional capacity of approximately 11,700 beds. Construction dropped almost to a standstill during the depression years. And hospital construction especially, during the mid-1930's, was at a low ebb. Early war years saw some emergency building but not enough to dent the long-accumulated deficit.

Following World War II, materials again began to flow into construction. With the enactment of Public Law 725 (79th Cong., 2d sess.), providing Federal aid for hospital survey and construction on a matching-funds basis (the Hill–Burton program), impetus was given to hospital and health center construction. During the period 1947 through 1950, hospital bed capacity jumped to an average increase of 32,800 beds per year.

By January 1951, the total acceptable hospital bed capacity throughout the States and Territories exceeded a million beds. The rate of construction for the year 1950 was about 57,000 new beds, of which an estimated 12,000 are considered to be for attrition due to fire, obsolescence, and other causes, leaving a remainder or net gain of 45,000. But the bed deficiency still was 873,000 and only 54 percent of the Nation's needs were being met.

For public health centers and such auxiliary health facilities as laboratories and clinics, present program plans of the States call for an increase to two and one-half times the number of existing facilities. Ultimately, needs will require an increase of 8 to 10 times the number we now have.

Because full CMP has been in operation for such a short time, data available within the Division of Civilian Health Requirements covers only 6 months of actual experience in estimating and allocating controlled materials for health facility construction. Current construction of health facilities under CMP can be analyzed, therefore, only in terms of materials requested, materials received, and projects processed by the division since the commencement of CMP—that is, the third and fourth quarters of 1951 and the first quarter of 1952.

The table shows the record of materials requirements submitted by the Public Health Service, allocations received, and percentages of the relationship between allocations and estimated requirements for each quarter.

PHS requirements and CMP allocations for health facility construction by calendar quarter

	Carbon and stainless steel (tons)	*Copper wire and brass mill products (000 lb.)*	*Aluminum (000 lb.)*
Third quarter 1951:			
Requested	102, 852	7, 256	1, 059
Received	75, 475	4, 514	550
Percent of requirements received	73	62	52
Fourth quarter 1951:			
Requested	101, 206	4, 375	1, 049
Received	81, 529	2, 640	500
Percent of requirements received	81	60	48
First quarter 1952:			
Requested	99, 305	3, 699	619
Received	71, 285	2, 733	400
Percent of requirements received	72	74	65

More than 2,000 construction project proposals have been processed within the Division of Civilian Health Requirements since the beginning of CMP. Of this number, approximately 60 percent represents hospital and health facility construction under way as of July 7, 1951, and 40 percent represents proposed new construction "starts."

To date, all under-way projects have been approved with the exception of a few large construction jobs in which the metals requirements exceeded the allotment capacity of the division. A few—87—fourth-quarter 1951 applications for new starts were deferred and most of the new starts—145—for the first quarter of 1952 were deferred. In the first quarter of 1952, approximately 90 percent of the metals allotments were made for projects under way.

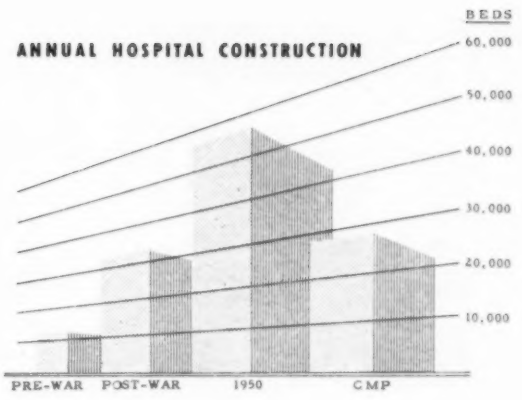
These figures may perhaps be better expressed in the tabulation below showing the number of new hospital construction projects processed in the division and the number of beds to be added to the Nation's total upon completion of the proposed projects. Excluded are projects for rewiring, boiler repair, reroofing, or any similar construction jobs not adding to the bed capacity of a facility. The figures given for the first 3 months of 1952 are by their nature estimates, and as such represent proposed hospital projects approved on the basis of the controlled materials available for allotment as of November 30, 1951.

Construction of hospital beds authorized under the Controlled Materials Plan

Period of authorization issuance	*Number of new projects approved*	*Estimated additional beds*
1951 (July–Aug.–Sept.)	190	14, 250
1951 (Oct.–Nov.–Dec.)	150	8, 600
1952 (Jan.–Feb.–Mar.)	100	4, 000

Assuming that in the second quarter of 1952, the commencement of new hospitals will be on a par with 1952's first quarter, we can estimate the expected total of additional hospital beds to be provided by new construction projects starting during the 12-month period beginning July 1951 and ending June 1952, as approximately 30,850. If this expected total is compared with the calendar year 1950, it represents 54 percent of the total bed capacity attained during 1950. For the same 12-month period, it is estimated that 60 new health center projects will be started, representing 4 percent of the existing programed need.

It is apparent that the rate of hospital construction is not in keeping with needs. It is evident that although we face a shortage of health facilities, the situation cannot be corrected at the present rate of programing hospital and health facility construction within the quarterly metals quotas assigned under CMP. But it should be stressed that without CMP, hospital contractors and builders would be forced to compete on the open market, thus opening the way to prohibitive costs and unfair and discriminatory practices and without any assurance of seeing a construction project through to its final completion and operation.



The Health Program and the NPA

The Public Health Service believes that production of sufficient health and medical supplies and equipment must be maintained at a consistently rising level to stock new hospitals and other health-connected buildings when their construction phase is complete, and to provide for military, civil defense, and normal civilian health requirements. Production must be maintained also, insofar as possible, to provide for repair, maintenance, and operating supplies and equipment in health facilities.

There are three industry divisions within the National Production Authority whose allocation programs of controlled materials are of major importance to public health needs. Two of these three divisions are closely allied to the Public Health Service claimant program because they request and allocate the metals necessary to manufacture hospital supplies and equipment. The Consumers Durable Goods Division and the Scientific and Technical Equipment Division share responsibility for the allocations to the manufacturers of medical equipment and supply items.

Municipal water supply and sewer construction programs are not included in the Public Health Service area of claimant activities but come within the jurisdiction of the Water Resources Division, the third health-allied NPA industry division. It is responsible for allocating controlled materials to both domestic and industrial water and sewage projects, except operations for navigation, flood control, reclamation and irrigation, hydroelectric generation of power, recreation, and fish and wildlife.

Courtesy S. Blickman, Inc., Weehawken, N. J.

New equipment—such as this—is needed for hospitals under construction and to replace obsolescent equipment.

G. E. Arnold, director of the Water Resources Division, has stated the public health aspect of this construction: "Water and sewage facilities are essential to maintenance of the public health. Every effort will be made to maintain essential public health facilities, but because of the critical shortage of materials many desirable, if not essential, water and sewage construction jobs will have to be deferred. It is urged that only those jobs that can be classed as strictly essential to public health be constructed at this time."

Most medical equipment and supply items are manufactured from metals allotments approved by the Scientific and Technical Equipment Division of NPA. Among other categories of products, the division receives allocations for the distribution of controlled materials required for the manufacture of optical instruments and ophthalmic goods, laboratory, dental, surgical, medical and scientific instruments, and surgical and orthopedic appliances and supplies. Like the Public Health Service, it operates under a policy of priority consideration in distributing quarterly allotments. Essentiality is divided into three preference groups:

1. The direct requirements for armament and defense purposes—precision devices and instruments for military or atomic energy programs are examples.

2. Other essential (and immediately necessary) requirements—such as any of the medical and surgical types of equipment required for civilian health use.

3. Requirements which can, if necessary, be substantially reduced as facilities are converted to the production of materials for defense—for instance, clocks or watches.

In keeping with the policy of the NPA, the Scientific and Technical Equipment Division, according to Howard A. Pringle, its director, "is exerting every effort to provide sufficient medical equipment and instruments for both military and essential civilian needs. Some substitution of less critical for more critical materials may be necessary whenever the functional qualities of the product will not be impaired by such substitution. There is every indication that there will be adequate supplies in all essential categories for all needs in this field."

Analysis shows that the estimated metals requirements made by the Scientific and Technical Equipment Division for the first quarter of 1952 were granted at the level of between 75 to 95 percent of need. Actual weight allotments of metals for this quarter compare favorably with the first two operating quarters under CMP. Few problems have developed in programing medical supplies, and when this has happened, the division has responded by reducing some of the metals allotments in the lowest priority group.

In line with NPA policy, the Consumers Durable Goods Division classifies as "preferred products" items possessing military, public health, medical, or civil defense application. "We consider health and medical supplies as 'preferred products' and give them top priority along with many military items," the division's director, Harry J. Holbrook, has stated, adding, "hospital kitchen equipment, for example, is vitally important to the successful operation of our medical care institutions. We will do our best to see that sufficient materials are channeled into these essential products to care for real needs." First-quarter 1952 allocations for preferred products averaged about 65 percent of

the consumption of the base period, January to June 1950.

The next priority grouping covers the bulk of consumer items used in homes and businesses—refrigerators, domestic stoves, and office desks and supplies. Naturally, normal consumer requirements comprise a significant proportion of the national metal supply. First-quarter 1952 allocations were made at levels of 50, 35, and 35 percent of the base-period consumption of steel, copper, and aluminum, respectively.

The lowest priority class contains a variety of least essential items for which known substitutions can be made for metals, or which can be entirely eliminated. Jewelry, advertising signs, venetian blinds, fireplace equipment are types of products found in this category in which allotments made for copper and aluminum were at 10 and 20 percent of the base period and 50 percent (or more, under some conditions) for steel.

Production Policy for Defense

Growing civilian needs and increasing military and civil defense purchases are the most important factors behind the increase in consumption of medical supplies. Population growth, our improved economic status generally, and the resultant demand for medical care have, in recent years, increased civilian consumption. It is expected that for the military procurement program there will have been expended 425 millions of dollars on medical supplies alone during the 12-month period ending June 1952. Compare this with the fiscal year ending June 1950, just preceding Korea, when 35 millions of dollars was the extent of the same procurement. Civil defense purchasing entered the medical supply field in the year just past, and this year it is expected that civil defense purchases will range between 75 and 85 millions of Federal and State funds.

In a sense, part of the problem of allocating metals is impossible to solve at this stage. The amount of controlled materials available is not sufficient "to keep everybody happy." Total stated requirements of estimated national needs for the first quarter of 1952 amount to 65, 61, and 51 percent more than the available supply of steel, copper, and aluminum.

Industrial, institutional, and farm scrap drives to recover usable metals are being promoted through the press, trade associations, chambers of commerce, and government agencies. A long-range program to aid industry in expanding its production of critical metals is now in process. Since it takes steel to produce steel, it can be expected that a significant portion of the controlled materials now available will be devoted to increasing industry's production capacity.

The general policy under which CMP now operates requires that all uses of critical materials must receive some consideration whatever the level of essentiality may be. Defense Mobilizer Charles E. Wilson clarified the policy in his report surveying the first 3 months of CMP progress: "Keeping in mind that defense mobilization is a long-range program, our aim is to build our military productive capacity while maintaining at least a minimum operation of civilian industry—rather than undertake wholesale conversion of civilian plants as we would be forced to do under conditions of full mobilization."

The current pattern of allotting controlled materials permits allotments for "least essential" products at a lower percentage, it is true, of their stated requirements than approved for the more preferred product classes, but manufacturers of these products may hope to continue "in business" until a normal product conversion to essential categories can be accomplished. The first 6 months of controlling materials and production was a period of transition. We can expect that the early months of 1952 will be a lengthening of the transitional period. At the same time, we may expect that, with no change in the international atmosphere, construction of hospitals and health facilities and the manufacture of medical supplies and equipment for civilian use will continue because they are indispensable health programs—but they will continue at a lower rate.

Susceptibility of Anopheles Quadrimaculatus To Korean Vivax Malaria

By MARTIN D. YOUNG, Sc. D., and ROBERT W. BURGESS, Ph. D.

During the summer of 1951, it became increasingly evident that many of the troops returning to this country from Korea were relapsing with malaria. In a personal communication dated September 15, 1951, Dr. Tom Whayne, of the Division of Preventive Medicine, Department of the Army, stated that during the 14-month period ended August 31, 1951, 6,642 cases of malaria had been reported in 100,618 individuals returned from the Far East Command, a reported incidence of 6.6 percent. The case histories indicated that the malaria was acquired in Korea.

The possibility of foreign malarias becoming established in this country is of vital concern to all health officials, especially at the present time, because of the current low incidence of indigenous malaria and the hopeful and progressive signs of its eventual eradication.

The object of the present study was to test the ability of the most important native malaria vector, *Anopheles quadrimaculatus*, to become infected with and to transmit the malaria relapsing in returned troops.

Methods

Veterans with clinical symptoms and positive blood smears volunteered for the tests. Only those soldiers whose histories indicated that their malaria had been acquired in Korea were used in the experiment. Fifty-three patients were tested.

Table 1. Malaria infections in *A. quadrimaculatus* mosquitoes infected by biting 35 soldiers relapsing with *vivax* malaria acquired in Korea

Patient No.	Mosquitoes fed upon patients			Oocyst per infected gut (average)
	Number dissected	Number infected	Percent infected	
K-2	23	8	35	1.0
K-3	14	4	29	1.0
K-6	29	18	62	7.9
K-10	13	4	39	1.6
K-13	24	19	79	127.0
K-14	22	21	96	261.0
K-15	32	32	100	58.0
K-17	20	12	60	2.6
K-18	20	2	10	2.0
K-19	20	19	95	27.0
K-20	20	14	70	2.9
K-21	20	1	5	1.0
K-23	20	16	80	4.8
K-24	39	36	92	267.0
K-26	20	4	20	3.0
K-29	27	24	89	13.4
K-32	22	21	96	12.2
K-33	43	40	93	38.2
K-34	20	2	10	1.0
K-35	20	15	75	111.1
K-36	21	12	57	4.6
K-38	20	15	75	13.3
K-39	33	30	91	16.8
K-40	20	12	60	3.0
K-42	44	43	98	156.7
K-43	20	16	80	16.6
K-44	21	15	71	8.0
K-45	20	2	10	1.0
K-46	22	20	91	18.2
K-47	25	24	96	35.2
K-48	23	11	48	3.9
K-50	10	10	100	43.2
K-51	20	10	50	3.3
K-55	25	8	32	2.4
K-57	21	21	100	124.0
Total	813	561		
Average	23.2	16.0	65.5	39.8
Median	21	16	75	8

Dr. Young and Dr. Burgess are with the laboratory of tropical diseases of the National Microbiological Institute, National Institutes of Health, in Columbia, S. C. *Their paper was presented at the joint meeting of the National Malaria Society, the American Society of Tropical Medicine, and the American Society of Parasitologists November 17, 1951, in Chicago.*

A. quadrimaculatus, Q–1 strain, were allowed to obtain a single blood meal by biting the soldiers before treatment for malaria was started. The insects were then incubated at 76° F± 2°, at a relatively high humidity. Dissections were begun 6 to 8 days after the blood meal, to determine if malarial oocysts were present on the gut. If a group of mosquitoes proved to be infected, either moderately or heavily, some of the mosquitoes were incubated several days longer and then dissected to determine if sporozoites were present in the glands.

At least 10 mosquitoes from each group were dissected; the usual minimum number was 20.

Observations

Plasmodium vivax was the organism found in all the infections observed. Of the 53 patients tested, 35 (66 percent) were infective to *A. quadrimaculatus* (table 1); 18 lots of mosquitoes (1,192 individuals) showed no infection after biting the remainder of the patients in the tested group.

Some of the mosquitoes showed extremely heavy infections; those fed upon patient K–24 averaged 267 oocysts per gut. The infection in the mosquitoes followed a fairly normal pattern and completed the cycle, with sporozoites demonstrated in the salivary glands. The infected mosquitoes transmitted the malaria to persons with neurosyphilis when the latter were exposed to their bites.

Discussion

Malarial infections in the troops tested were undoubtedly delayed primary attacks or relapses, probably the latter. The histories indicated that the relapsing patients had been in Korea during the malaria season of 1950 or 1951, usually the former year. A single tablet containing 0.5 gm. chloroquine diphosphate (equivalent to 0.3 gm. of the base) had been given weekly as a suppressive treatment (*1*). Sometimes this weekly dose was missed because of the exigencies of battle. As a rule, the first frank attack of malaria did not occur until suppressive drugs were discontinued, either during or after the soldier's return to the continental United States.

The military personnel tested by us were bitten by mosquitoes within a few hours after a definite diagnosis of malaria was made. Two-thirds of them were infective to mosquitoes, about one-half of them highly so. Past experience (*2*, *3*) has shown that malarious patients may be infective to mosquitoes for several days before the first frank malarial paroxysm or during asymptomatic periods. Therefore, it is likely that some of these soldiers were capable of infecting mosquitoes before a diagnosis of malaria was made.

It is evident from our results that the malaria in returning troops is infective to a mosquito vector. The pattern of the relapses so far is such that most of them occur during the malaria transmission season in the United States. As a result, the potential exists for the establishing of foci of malaria. On the other hand, because of the present awareness of this danger by local, State, and Federal health authorities and by the officials of the armed services, who are employing control measures in the vicinity of hospitals, the danger of establishment and spread of this foreign malaria is greatly lessened. The weakest link in this chain of protection is the individual veteran who has malaria. The Korean veteran with whom we have had contact does not seem to be as well indoctrinated as the veteran of World War II in the possibility that he may develop or relapse with malaria. When the World War II veteran relapsed, he would often suggest malaria to the physician as the cause of illness, but, in general, the Korean veteran does not appear to have this awareness of malaria. However, the Army recently has begun to inform veterans returning from Korea that they may develop malaria. These troops are given a prepared statement to that effect, to be presented to a doctor if malaria symptoms occur.

The relapse pattern suggests that the Korean *vivax* malaria differs from the South Pacific malaria which was imported following World War II. At present, studies are under way to determine certain biological phenomena of the Korean malaria, such as characteristics of the primary infection, natural and acquired immunity, and the comparative infectiousness of Korean malaria to various vectors.

Summary and Conclusions

1. Fifty-three returned veterans with *Plasmodium vivax* infections, apparently of Korean origin, were bitten by *Anopheles quadrimaculatus* mosquitoes. In 35 of these cases the mosquitoes developed malaria.

2. The *A. quadrimaculatus* mosquitoes appeared to be highly susceptible to the malaria tested; in favorable cases, 100 percent of the insects were infected; and the infections developed to maturity. Transmission to susceptible persons by mosquito bites was successful.

3. The potential for the establishment of foreign malarias is present. The weakest link in the chain of control is the apparent lack of appreciation of the danger of relapse with malaria on the part of the infected veteran. With the present awareness of the danger by health authorities and officials of the armed services, the chances of this malaria becoming established are greatly lessened.

ACKNOWLEDGMENT

We are indebted to Col. Kermit H. Gates, MOC, and the staff of the Fort Jackson, S. C., hospital for their cooperation in these studies. Also we wish to thank Dr. Tom Whayne, chief of the Division of Preventive Medicine, Department of the Army, for information concerning the incidence of malaria in returned troops.

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Radiological Health Training Courses

Training courses in radiological health will be given by the Public Health Service at its Environmental Health Center in Cincinnati, Ohio, beginning January 21, 1952. The program has been instituted to aid professional workers in the related fields of radiation to achieve a broader understanding of its hazards and problems.

Candidates should have a degree in medicine, engineering, physical science, or biological science, and experience in work relating to public health.

Basic courses are scheduled for January 21 to February 1, March 10 to 21, and April 21 to May 2, 1952.

Intermediate courses are scheduled for February 4 to 15, and May 5 to 16, 1952.

The subjects outlined for the basic course are the theory of radiation and detection instruments, use and maintenance of instruments for measuring radiation, the detrimental effects of radiation, methods used for protection and shielding against radiation, and the recommended permissible dosage.

Intermediate courses for those having completed the equivalent of the basic curriculum provide 2 weeks of training in the operation, maintenance, and repair of radiation detection devices used in the monitoring of personnel and in the monitoring of water, food, and other samples.

Additional information concerning the curriculum and application procedure may be obtained from the Chief, Radiological Health Training Section, Environmental Health Center, 1014 Broadway, Cincinnati 2, Ohio.

Venereal Disease Control Program In Transition

By THEODORE J. BAUER, M. D.

Substantial gains continue to be made in reducing the incidence of syphilis in the United States.

Total syphilis morbidity reached an all-time low of 214,000 cases in fiscal year 1951. This is a reduction of nearly two-thirds since 1943.

Admissions to mental institutions for psychoses due to syphilis were reduced by one-half in the decade 1939 to 1949.

Mortality due to syphilis in the period 1937 to 1950 also was reduced by one-half.

Our balance sheet, however, is not all credits. Some items still are entered in red ink: gonorrhea rates continue high—about 280,000 reported cases per year; there is evidence that chancroid is on the upgrade in one or two areas.

But, of considerably more significance, there is evidence that where control activity has been relaxed in this country since World War II, venereal disease rates have remained high. Although these instances are few, they are ominous.

It never has been the policy of the Division of Venereal Disease to cry "wolf!" We do not consider that venereal disease will get out of hand again. On the contrary, we are determined that our control efforts will force a continued decline in morbidity and mortality.

Dr. Bauer is chief of the Division of Venereal Disease, Public Health Service. *He presented this paper at the Venereal Disease Control Seminar held in New Orleans, La., October 3–4, 1951.*

There is, however, no foreseeable terminus to venereal disease control short of extinction of the disease organisms in this country and abroad. Generally, communicable disease control is based on at least four fundamental operations:

1. Immunization of the population.
2. Isolation of the host.
3. Elimination of the intermediate host.
4. Destruction of the organism.

Only Control Element

In venereal disease control, we have no agent for immunizing the population. If one were available, its use would be questioned and its application costly.

We cannot isolate the host without branding him as a moral delinquent—which (by any standards) frequently is not the case; without finding him—which even now we can do only in about one-half of the cases; and without an infallible diagnostic procedure—which we do not have.

We cannot eliminate the intermediate host, since there is none.

We can destroy the organism, but only after it has announced its presence in the host—an announcement which may or may not be heeded if noted, and an announcement which frequently is never noted.

Thus, our entire control effort is balanced precariously on only one of the four elements in the classic foundation of communicable disease control. With the single exception of treatment, the odds in this struggle are with the spirochete and the gonococcus. Especially is

this true during such a tense period of preparation of our defenses for the potentialities of aggression as the present.

Program Change Indicated

If we are to maintain the gains we have made to date and continue to extend them in the future, certain shifts in program policy and operation seem clearly indicated.

Our program must be shaped to current changes in the character and location of the problem, the movements of the population, and trends in therapy. One device for this orientation of program to problems in venereal disease control is increased project assistance.

These projects make possible the immediate application of Federal, State, and local resources to specific venereal disease control problems within the States and communities, wherever such problems arise and for as long as they exist. Federal project assistance supplements State and local resources and other types of Federal aid which support more permanent activities and do not permit the operational flexibility of project assistance.

Because of the scattered and shifting foci of infection, State and local health departments may not be expected to carry the burden of control and programing alone. These foci often are located in areas extending across State and local boundaries and can be detected only from a searching analysis of data collected throughout the Nation. Activities deriving from these analyses require joint planning and programing by Federal, State, and local agencies, including the military.

Large-scale case-finding projects, as we now know them, could not have been initiated without the rapid treatment center. Their continuation after the centers were established served to exploit to the fullest the service potential of the rapid treatment center projects. So successful was this exploitation that the rapid treatment centers have, over the years, treated hundreds of thousands of infected individuals.

Treatment Methods Changing

During this period, treatment practice has progressed to such a degree that in many areas continued support of the rapid treatment center cannot be considered economically sound public health administration. For the most part, particularly in urban areas, treatment now may be administered more practically and efficiently in out-patient rather than in in-patient facilities. We are currently in transition between these two methods of treatment, and our control methods must be directed accordingly. I am convinced that the exploration, development, and administration of the most effective transition with the least loss in adequate control will result from project activities. These alone permit the flexibility of plan and operation required in the present transition period.

Interviewing Problem Created

To illustrate the difficulties that are involved in the transition from in-patient to out-patient therapy, consider the problem in interviewing: At the present time, and with notable exceptions, our evaluation reports indicate that the bulk of successful contact investigation is carried on by the States, where the majority of patients go to the rapid treatment centers for therapy. Here they are interviewed, educated, and reinterviewed, with resultant high contact indices and with sufficient care to permit location and examination of their contacts. Transition to the use of out-patient facilities means that interviewing skill no longer can be concentrated in one or a few rapid treatment centers, but must in some manner be made available to both out-patient clinics and private physicians. We may not be able to continue the process, basic to control, of finding and examining contacts of infectious cases when these cases appear in the out-patient clinic and the private physician's office.

In parts of the country which have never had as complete a rapid treatment center system as the South, much work has been done to meet the problem of providing interviewing skill in local areas. Such experience may be of considerable help to us. For example, the North Dakota State Department of Health is planning to use the State highway commission's broadcasting facilities, so that the venereal disease control office at the State capital can keep in constant communication with its two investi-

gators. These investigators work throughout the State in following contacts, suspects, premarital and prenatal cases, and all other persons who, by one means or another, can be benefited by epidemiological aids. Code use of such facilities can preserve the confidentiality of reports.

A group of Middle Western States is developing a program of mutual assistance which will permit interviewer-investigators from border areas and military stations to cross city, county, and State boundaries to carry out their investigations. This will be especially helpful when patients are unable to give the name and address of sex partners but would be willing to accompany an investigator in an effort to locate the contacts.

Expanded use of the telephone and telegraph facilities of the Nation increasingly will be called for as the incidence of venereal disease decreases and the work of venereal disease workers is extended to cover larger geographic areas and an increased number of admitting facilities.

Another program being undertaken by the Division of Venereal Disease is working with medical schools that offer postgraduate training to general practitioners and to specialists. We will arrange for physicians qualified in the field of venereal disease to speak at these postgraduate courses. They can present the latest information on diagnosis, treatment, and the need for providing an opportunity to interview the venereal disease patient to find his contacts. The general practitioners will be informed that this latter service will be made available by the State health authorities to the private physician, whether or not he is officially participating in the State's diagnosis and treatment plan.

It is my belief that interviewing can be improved everywhere. Part of this improvement should come from more effective methods applied in the patient interview. Part of it should derive from an extension of the time period in the patient's life covered by the interview. Still another part should derive from the careful interview of late syphilis and gonorrhea patients whom we have, for the most part, ignored in the past.

Finally, consideration and further study might be made of the possibility of including in our case-finding activities the investigation of the patients' friends, associates, and accomplices who broadly can be indicated under the term "suspects."

Interviewing and contact tracing require uncommon talents. Not everyone in public health work nor even everyone in venereal disease control work has these talents. Careful training is helpful. At present, we are working on a procedure combining training with self-selection. Mobile sound-monitoring equipment is being assigned to a number of larger local health departments in the country. With this equipment, interviewers may listen to each other in actual interview situations. Those who show exceptional skill and who demonstrate interest in this type of work will be encouraged by health officials in many areas to assume exclusive responsibility for interview-investigation activities.

Interviewing, however, is not the only problem raised by the discontinuance of some rapid treatment centers. Another factor inherent in the transition from in-patient to out-patient treatment applies to those who administer treatment. Physicians, local clinics, and health departments must be re-alerted to look for syphilis and to the best and most modern methods of diagnosis and proper treatment. We are now in the fortunate situation of being able to recruit and assign some of the junior medical members of the Public Health Service's Commissioned Corps to State health departments needing assistance during the defense mobilization period. These officers will be especially helpful in States where the transition from in-patient to out-patient is under way.

Attention has been directed to the problems we are facing and the adjustments we must make to meet them. Two more problems in this field deserve brief comment. One of them pertains to mass blood-testing surveys.

Mass Blood Testing Analyzed

Current analysis of mass blood-testing programs in high-prevalence areas indicates that:

1. They do not find all of the syphilis present in the population.

2. Unless the mass-testing activities are fortified with diligent investigation, they do not prevent the redevelopment of foci of infection.

Reports received from a survey in a large city in 1950 indicate a higher percentage of positive serologic results among a sampling of persons who did not apply for diagnosis during the survey than among those who did. Similarly, figures on syphilis morbidity subsequent to the blood-testing programs carried on in several areas clearly indicate that, in spite of the large numbers of persons tested during the programs, morbidity rates remain relatively high unless proper venereal disease control activity follows the survey.

It would seem, therefore, that mass blood-testing activities should be encouraged only among high-prevalence groups which are carefully pinpointed through the analysis of previous patient admissions, contacts, and suspects. These activities, in themselves, never should be considered to provide complete venereal disease control service.

Gonorrhea Control Important

The other problem relates to need of renewed activity in the mass control of gonorrhea. At the present time the Armed Forces report at least seven cases of gonorrhea for each case of primary or secondary syphilis. Though the treatment of gonorrhea is not a difficult problem in either civilian or military populations, its discovery is just as difficult as that of syphilis, and the finding of the infected sex partner of a gonorrhea patient involves the same painstaking interview and investigation procedures. Gonorrhea control is important. In the military its treatment wastes the attention and time of medical staffs and it still causes considerable loss of man-days to the defense effort. In terms of syphilis case finding, gonorrhea is a helpful indicator to the remaining and developing foci of venereal infection in the civilian population.

Generally speaking, good progress is being made in the entire field of venereal disease control. However, there is no justification for assuming that, when cases become fewer, control activities have to be lessened. Actually, it now is more difficult to find the few remaining cases than it was when there were many. We should not lose sight of the fact that the reason we control typhoid fever, smallpox, and diphtheria is that considerable effort and money continuously is expended in keeping our water pure and our children immunized. In the field of venereal disease, even when we reach a level at which control can be maintained, we will need to continue to supply a network of services for contact interviewing, tracing, and education in order to prevent a resurgence of the disease. Experience has shown that venereal disease has increased in areas where organized control efforts have been relaxed.

I am happy to report that relaxation of effort is not the mood of venereal disease control officials in the States and communities of this country today. They are requesting and getting the complete support of the Public Health Service in their vigorous follow-through of control activities.

Model Sanitation Regulations Protect 82 Million

More than 82 million Americans live in communities in which public eating and drinking establishments operate under sanitation regulations that meet the standards developed by the Public Health Service, according to a recent survey by the Bureau of State Services. Affected by these regulations are the combined populations of 675 municipalities and 346 counties in 42 States, Alaska, and the District of Columbia.

The bureau stated that this protection has more than doubled in the past 5 years. Only 40 million persons, living in 373 municipalities and 176 counties in 37 States and Alaska, were protected by these sanitation ordinances or regulations in November 1946.

Revised System

National Morbidity Reporting

By C. C. DAUER, M. D.

A revision in the list of reportable diseases and modifications in reporting procedures were formally approved October 31, 1951, by the Association of State and Territorial Health Officers. This represents a major forward step in the improvement of the national scheme of morbidity reporting.

The new system went into effect on January 1, 1952. Its approval by the State health officers is the product of extensive discussions and studies, plus a national conference of epidemiologists, health statisticians, and public health administrators. A manual of instructions covering the approved procedures was distributed to all State and Territorial health officers December 1, 1951, by the Public Health Service.

The main change in the revised system is the addition of eight diseases to the list that States have been reporting each week to the Public Health Service. Two diseases are deleted.

Botulism, brucellosis, dengue, infectious hepatitis, malaria, rabies in man, trichinosis, and typhus fever have been added to the weekly list. Influenza and pneumonia will no longer be reported weekly or annually to the Public Health Service. The consensus is that a better estimate of the prevalence of these diseases can be obtained through reports of respiratory outbreaks and of appropriate laboratory examinations, in combination with mortality records.

Statistics for the 25 diseases now on the weekly list (table 1) will appear in summary form for the United States in the *Communicable Disease Summary* and for each State in the *Morbidity and Mortality Weekly Report*, both published weekly by the National Office of Vital Statistics.

Monthly summaries of communicable diseases from the States have been discontinued. Instead, States will submit annual summaries, by month and by county of residence, of 39 diseases (table 2). The annual summaries are a return, in part, to reporting practice prior to 1948. Diseases for which acceptable laboratory tests are available to confirm the diagnoses will be tabulated by the final total number reported and the number confirmed by laboratory examination. Annual summaries by months will be published in special reports; the summaries by county of residence will not be published generally but will be made available to persons who request and need such information.

New Emphasis on Epidemic Reporting

A parallel and complementary development in morbidity reporting is the increased emphasis on epidemic reporting. Reports of disease outbreaks are now collected and published on a current basis. The system is working well but full participation by local health officers is sought. All State and Territorial health officers have been requested to report promptly any outbreak or unusual occurrence of diseases of public health interest or importance. Weekly publication of this information will continue.

Responsibility for collecting reports of food- and water-borne outbreaks of disease—previously an activity of the Division of Sanitation—has been assigned to the National Office of Vital Statistics. These reports are made currently rather than at the end of each year, and information from them is included in weekly publications of the Public Health Service's National Office of Vital Statistics. An annual summary of food- and water-borne outbreaks will be continued as heretofore.

Dr. Dauer, formerly chief of the Bureau of Preventable Disease of the District of Columbia Health Department, is medical advisor to the National Office of Vital Statistics, Public Health Service.

Procedures for National Morbidity Reporting

Approved by the Association of State and Territorial Health Officers

I. *International Quarantine Agreement*

An international quarantine agreement to which the United States is a signatory requires the immediate notification by telegram of the following diseases to the Surgeon General of the U. S. Public Health Service:

Cholera.
Plague.
Smallpox.
Typhus fever, epidemic (louse-borne).
Yellow fever.

II. *Epidemic Reports*

All outbreaks or unusual occurrences of communicable and other diseases of public health interest should be reported promptly to the U. S. Public Health Service. All such reports should be sent by or through the State health officer.

III. *Weekly Summary of Notifiable Diseases*

The total number of cases not previously reported for a minimum list of diseases (table 1), should be reported weekly to the Public Health Service by each State. Such reports are considered as provisional data, subject to further screening by all interested agencies.

IV. *Annual Summary of Notifiable Diseases*

A. Annual summary by calendar year should be made to the U. S. Public Health Service for an expanded list of diseases (table 2).

B. The annual summary should consist of the following tabulations:

1. State totals of cases not previously reported of the diseases in table 2 by month, with specification of method of allocation to month according to one of the following:

(a) Date of onset.
(b) Date of report.
(c) Date of receipt of report by local health office.
(d) Date of receipt of report by State health office.
(e) Other (specify).

2. State totals of laboratory confirmed cases. The States should individually establish standards for acceptable laboratory confirmations for inclusion in these reports to the U. S. Public Health Service, recognizing the desirability of eventually achieving uniformity of these standards among the States. (This is an attempt to secure information on the number of cases of certain diseases, such as diphtheria, typhoid fever, etc., which were confirmed by a laboratory test. The suitability of a test for confirmation of diagnosis is left to the State health officer.)

3. Annual totals of notifiable diseases by county of usual residence for each disease in table 2.

Table 1. Weekly summary of notifiable diseases

Anthrax	Plague
Botulism	Poliomyelitis
Brucellosis	Rabies in man
Cholera	Rabies in animals
Dengue	Rocky Mountain spotted fever
Diphtheria	Smallpox
Infectious encephalitis	Streptococcal sore throat, including scarlet fever
Infectious hepatitis, including serum hepatitis	Trichinosis
Malaria	Tularemia
Measles	Typhoid fever
Meningococcal meningitis and meningococcemia	Typhus fever, endemic
Pertussis (whooping cough)	Typhus fever, epidemic
	Yellow fever

The inclusion of certain notifiable diseases in the weekly summaries and the expanded reporting of disease outbreaks were recommended partly because the data may provide vital information in defense against biological warfare. Many of the diseases listed for weekly reporting are caused by organisms regarded as potential agents that might be employed in subversive activities.

Wide Use for Data

Originally, communicable diseases were reported primarily to determine, as soon as possible, the prevalence in the community of diseases dangerous to the public health—especially the pestilential diseases. Reporting served as the first step in applying control measures such as quarantine. Later, the collection and assembling of such data provided basic material needed by local and State agencies for planning more effective programs for the prevention or control of some infectious diseases. They have also indicated the futility of severe restrictive measures in attempting to control others.

Health officers of local areas and States, as well as Federal and international agencies, need

Table 2. Annual summary of notifiable diseases [1]

- Amebiasis
- Anthrax
- Botulism
- Brucellosis
- Cholera
- Dengue
- Diphtheria
- Glanders
- Infectious encephalitis (by etiology if known)
- Infectious hepatitis, including serum hepatitis
- Leprosy
- Leptospirosis
- Malaria
- Measles
- Meningococcal meningitis and meningococcemia
- Pertussis (whooping cough)
- Plague
- Poliomyelitis
  - Paralytic
  - Nonparalytic
  - Unspecified
- Psittacosis
- Q fever
- Rabies in man
- Rabies in animals
- Rocky Mountain spotted fever
- Salmonellosis
- Shigellosis
- Smallpox
- Streptococcal sore throat, including scarlet fever
- Tetanus
- Trachoma
- Trichinosis
- Tuberculosis (all forms)
- Tularemia
- Typhoid fever
- Typhus fever, endemic
- Typhus fever, epidemic
- Yellow fever
- Venereal diseases
  - Chancroid
  - Gonorrhea
  - Granuloma inguinale
  - Lymphogranuloma venereum
  - Syphilis
    - Primary and secondary
    - All other

[1] All diseases for which laboratory confirmations are available are to be reported by (1) total cases, and (2) total laboratory confirmed cases.

V. *Venereal Diseases and Tuberculosis*

The annual summary of notifiable diseases should contain tabulations of the number of tuberculosis and venereal disease cases. This does not affect the collection and distribution of certain data by the Divisions of Chronic Disease and Tuberculosis and of Venereal Disease of the U. S. Public Health Service from States for purposes of program development or operational activities.

VI. *Morbidity Reports From Cities*

The subcommittee notes that arrangements exist whereby weekly morbidity reports are furnished to the National Office of Vital Statistics by a selected list of cities throughout the United States. It is the consensus of the committee that this procedure should continue, but it recommends further study of the purposes and procedures for such reports.

VII. *National Morbidity Reporting Procedures*

The reporting procedures needed to implement the collection of the data described in the recommendations of the committee will be defined in a manual of morbidity reporting procedures prepared by the National Office of Vital Statistics. The draft of this manual has been prepared by the National Office of Vital Statistics with consultation from this subcommittee, Communicable Disease Center, Divisions of Chronic Disease and Tuberculosis and of Venereal Disease of the U. S. Public Health Service, and the Working Group on Morbidity Statistics of the Public Health Conference on Records and Statistics. This manual should be distributed to all States and other appropriate agencies if and when the national morbidity reporting plan is approved by the Association of State and Territorial Health Officers.

VIII. *Reporting Animal Diseases*

Information as to the occurrence of certain animal diseases which may be transmitted to man is urgently needed for prevention of those diseases in man. Such information should be furnished by veterinarians and others through suitable channels for availability to local, State, and national health agencies. The threat of biological warfare adds to the urgency of developing this program, although the need for it has been apparent for many years.

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current information on incidence of disease to study present or new problems, locally, nationally, or internationally. They must also have data to set up appropriate and effective preventive or control measures as the need arises. A communicable disease reporting system that operates smoothly and effectively during a national emergency or castastrophe is a necessity. It would be especially important if the threat of biological warfare or atomic bombing became a reality.

Medical researchers and physicians have urgent need for data on the incidence of infectious diseases. A physician who has a special interest in a disease such as tularemia or diphtheria, or the research worker who is studying streptococcal infections, often needs and asks for nation-wide data in order that he may have a sounder basis upon which to develop better methods of treatment or prevention. The need is also apparent in requests for information that may be used in preparing papers to be read at scientific meetings or for publication in journals or books.

Increasing demands for similar data on chronic diseases may lead, in the near future, to more adequate collection methods in this field. Some attempts have already been made to use

hospital statistics as an index of the prevalence of chronic diseases.

Morbidity data are much in demand for general information and health education. Information is needed by persons engaged in health activities in official and nonofficial health agencies. Material supplied to the press, the radio, feature writers of magazines which have a general distribution, and to various publications, such as yearbooks, assist in health education. Private citizens, students, and others request national morbidity data for a variety of uses.

Commercial organizations, such as insurance companies, manufacturers of pharmaceutic and biological products, and other business groups have a legitimate need for morbidity data in planning and developing services and products.

Evolution of Morbidity Reporting

Occasionally, rapidly changing characteristics of a disease have called for relatively rapid changes in reporting, collecting, and disseminating the data. The severe epidemic of poliomyelitis in 1916, the pandemic of influenza in 1918, the explosive emergence of encephalitis in St. Louis in 1933, and the recent increase of malaria among military personnel returning from Korea, all resulted in relatively quick changes in reporting procedures to provide essential data for evaluating new situations.

But most of the changes in the Nation's 74-year-old communicable disease reporting system have evolved slowly. The Public Health Service was first authorized, by an act of Congress in 1878, to collect morbidity data for use in quarantine measures against such pestilential diseases as cholera, smallpox, plague, and yellow fever. One year later, a specific appropriation was made for the collection and publication of reports of notifiable diseases, principally from foreign ports. In 1893, an act provided for collection of information each week from State and municipal authorities throughout the United States. To obtain uniformity in the registration of morbidity statistics, Congress enacted a law in 1902 which directed the Surgeon General of the Public Health Service to provide forms for the collection, compilation, and publication of the weekly data.

Reports on notifiable diseases were received from a very few States and cities prior to 1900, but gradually more and more States submitted monthly and annual summaries. It was not until after 1925 that all States reported regularly.

In 1913, the State and Territorial health authorities recommended weekly telegraphic reports by States for a few diseases, but several years elapsed before a large number submitted figures in such a manner.

Public Health Service personnel were first assigned in 1914 as collaborating epidemiologists to State health departments to assist in preparing the reports. Later, State health officers were designated as collaborating epidemiologists, and local officials were appointed as assistant collaborating epidemiologists. Beginning in 1915, the collaborating epidemiologists in a few States used report cards with penalty privileges. In 1919, the policy of supplying cards to all States was established by request of the State and Territorial health authorities. However, not all States have used morbidity report cards which carry the penalty privilege.

Reciprocal notification of diseases in persons presumably infected outside the State was practiced by Minnesota as early as 1914. However, other States did not participate until after 1917, when the State and Territorial health authorities recommended the adoption of this practice.

Until 1942, the collection, compilation, and publication of morbidity statistics was under the direction of the Division of Sanitary Reports and Statistics of the Public Health Service. These functions were transferred to the Division of Public Health Methods in 1942, and to the National Office of Vital Statistics in 1949.

Product of Many Groups

The current plan is the product of much discussion and weighing of needs.

In 1948, a limited revision of morbidity reporting procedures was instituted following a study by a group in the Public Health Service. Soon after the transfer of morbidity reporting activities to the National Office of Vital Statistics, another committee in the Public Health Service was appointed to review the procedures then in operation and to present a revised plan which would more nearly meet the needs of

both State and Federal health agencies and aid in providing essential information for civil defense. The threat of biological warfare has been an added incentive to the development of a revised program of morbidity reporting.

A plan was submitted to the Association of State and Territorial Health Officers at their meeting in Washington, October 23–27, 1950. The action taken was in the form of a recommendation that all States cooperate with the Public Health Service in a 1-year trial of the "Plan for Revising Morbidity Reporting by States," effective January 1, 1951. Because certain technical problems arose regarding operation of the plan, the effective date was postponed.

On January 13, 1951, the Association of State and Territorial Health Officers authorized a conference of State epidemiologists to determine what diseases should be reported by States to the Public Health Service and procedures to be followed in submitting weekly and annual summaries. A conference was held in Atlanta, Ga., April 18–20, 1951,[1] and subsequently an interim group, the subcommittee of the Committee of Infectious Diseases of the Association,[2] drew up the final report on the recommendations of the conference. The statement was also reported to the Committee on Administrative Practice of the American Public Health Association at its meeting in San Francisco on October 29. The State and Territorial Health Officers, meeting in the same city, unanimously approved the report October 31, 1951.

[1] For program see the CDC Bulletin, **10:** 18–22 May 1951.

[2] Members of the subcommittee were: Chairman A. C. Hollister, California; R. F. Korns, New York; A. S. McCown, Virginia; C. R. Freeble, Ohio; and A. L. Gray, Mississippi.

First Step in Larger Plan

The new morbidity reporting procedures are the first step in an over-all program for improvement of morbidity reporting. Some means of improving the completeness and promptness of reporting by physicians, methods for checking the completeness of reporting, development of acceptable standards for laboratory confirmation of certain diseases, greater uniformity in items of information reported for individual cases of notifiable diseases, and uniform methods for allocation of cases by residence and by months, are a few of the problems that need study and resolution. Some of these are already being considered by the Working Group on Morbidity Statistics of the Public Health Conference on Records and Statistics. Other studies bearing on these problems are being contemplated in cooperation with representatives of State health departments and of branches of the Public Health Service. Eventually, the studies should result in more accurate and dependable morbidity data.

A discussion of morbidity reporting as the basis of communicable disease control, presented by Dr. Wilson G. Smillie at the Conference of State Epidemiologists on National Morbidity Reporting, will be published in an early issue of PUBLIC HEALTH REPORTS.

From 1947 to 1951

Salaries of State Health Department Personnel

By SAM A. KIMBLE, A. B.

Median salaries of selected groups of State health department personnel have increased on an average of one-third during the 5-year period since 1947. The percentage increases ranged from a low of 20 percent for sanitary engineers to a high of 56 percent for sanitarians.

The real significance of these salary increases can only be discerned in the broader perspective of a decade or more of steadily rising living costs. Although knowledge of the salaries of public health workers was so fragmentary prior to 1947 that a sound evaluation of salary trends on a national scale was impossible, the information available indicated that during the early 1940's public health workers, as well as other public servants, were experiencing a persistent decline in real wages because of static salary levels.

To develop reliable and comprehensive salary data, the American Public Health Association and the Association of State and Territorial Health Officers in 1947 joined in asking the Public Health Service to participate in a 5-year series of nation-wide studies of salaries received by State and local public health workers. Results of these studies have been published each year (*1, 2*). This report summarizes the trends which have taken place in the salaries of State public health personnel during the 5-year period. Five-year trend data for salaries of local public health personnel will not be available until the next local salary study has been completed in the spring of 1952.

Data for the studies of the salaries of State public health workers were obtained directly from State health department payrolls. Two types of groupings were made in tabulating the salary data. One group includes salaries of personnel at the executive or director level. These are the State health officers and directors of dental public health, sanitary engineering, laboratory services, public health nursing, and vital statistics. Original plans to include directors of certain medical programs in this group were abandoned in 1950 because the increasing number of organizational combinations in State health departments was seriously affecting the comparability of positions from year to year and among the States. The other group includes personnel in the following professional categories (exclusive of the program directors included in the first group) : medical, nursing, sanitary engineering, sanitation, nutrition, health education (added in 1948), statistical (added in 1949), laboratory, and business management (added in 1950). In all of the studies, data on all medical directors (other than those directing laboratory and vital statistics programs) have been included in the general group of medical personnel.

Salaries of part-time and seasonal employees, of trainees, of State health workers assigned to institutions, and of personnel assigned to activities performed normally by local health units were excluded from the study. When identifiable, salaries of all personnel assigned to local health units or State districts offering direct local health services were also excluded. Although organizational patterns, responsibilities of individual positions, and position nomenclature vary considerably from State to State, sufficient comparability exists to justify broad comparisons among States and to study national trends. The median salary—that salary below and above which half of all the

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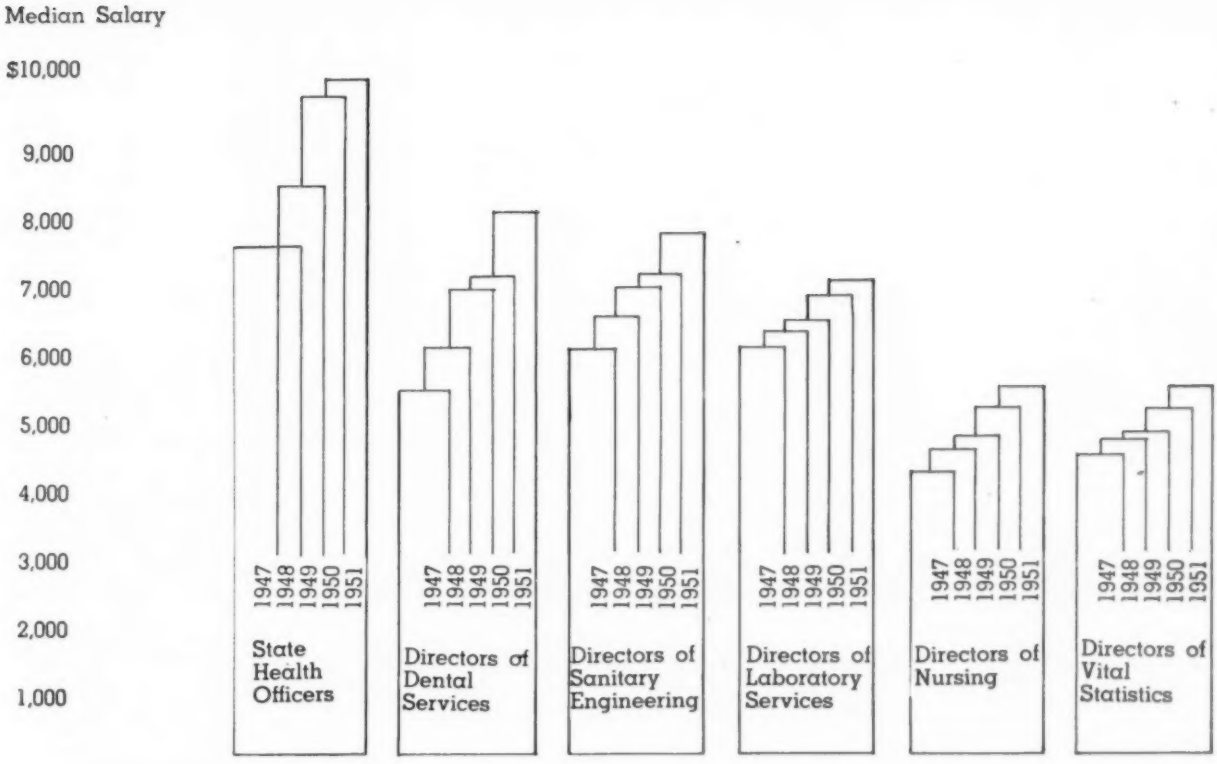

Figure 1. Median salaries of State health officers and selected directors of State health services, 1947–51.

individual salaries fall—has been used to measure trends in these studies.

Salaries of all groups included in the study increased during the 5-year period. Percentage increases in the median salaries of selected groups in State health departments between 1947 and 1951 are shown below:

	Percentage increase
State health officers	33
Directors of dental health services	50
Directors of sanitary engineering	29
Directors of laboratory services	25
Directors of public health nursing	29
Directors of vital statistics	21
Medical personnel	43
Sanitary engineers	20
Sanitation personnel	56
Professional laboratory personnel	21
Supervisory and consultant nurses	35

The table shows the distribution of salaries which were being paid in August 1951, the most recent period studied. Median salaries in 1951 for the types of personnel which are not represented in the 5-year trend study are: nutrition, $3,900; health education, $4,300; statistical, $3,900; and business management, $5,700.

State Health Officers

The most strategic position in the salary structure is held by the State health officer. Difficulties in keeping public health salaries from lagging behind costs of living and the competitive market for professional personnel often center around the reluctance of State legislatures to modify specific statutory salary rates applicable to the State health officer's position. The most significant changes in these salaries have occurred during the past 3 years (fig. 1).

The trend can also be illustrated by other facts. In 1947, the annual salaries of State health officers ranged from $5,000 to $15,000. The median salary for health officers that year was $7,500. Seven of these officials were then receiving $10,000 per year or more, and 15 were

Selected State health department personnel by specified salary intervals, August 1951

Salary intervals	State health officers	Medical personnel	Directors dental public health services	Environmental sanitation			Laboratory		Public health nurses		Directors vital statistics
				Directors sanitary engineering	Sanitary engineers	Sanitation personnel	Directors	Professional personnel	Directors nursing	Supervisory and consultant	
Total number	44	355	34	48	509	611	45	1,320	45	357	40
$15,000 and over	4	0	0	0	0	0	0	0	0	0	0
$14,000–$14,999	1	2	0	0	0	0	0	0	0	0	0
$13,000–$13,999	1	1	0	0	0	0	2	0	0	0	0
$12,000–$12,999	8	7	1	1	0	0	1	0	0	0	0
$11,000–$11,999	3	3	0	0	0	0	0	0	0	0	0
$10,000–$10,999	9	41	1	4	0	0	2	2	0	0	0
$9,000–$9,999	6	80	4	7	6	0	5	8	0	0	1
$8,000–$8,999	4	77	12	10	23	3	6	4	0	0	3
$7,000–$7,999	7	88	10	12	14	5	10	14	5	0	3
$6,000–$6,999	1	45	6	10	66	15	10	40	8	7	9
$5,000–$5,999	0	10	0	4	122	50	7	122	21	54	12
$4,000–$4,999	0	1	0	0	155	210	1	256	11	157	9
$3,000–$3,999	0	0	0	0	120	274	1	559	0	137	3
$2,000–$2,999	0	0	0	0	3	54	0	315	0	2	0
Under $2,000	0	0	0	0	0	0	0	0	0	0	0
Median salary	$10,000	$8,500	$8,100	$7,740	$4,800	$3,900	$7,500	$3,500	$5,400	$4,250	$5,460

receiving less than $6,600 per year. In 1951 State health officers' salaries ranged from $6,500 to $17,500 and the median salary had risen to $10,000, or one-third higher than the 1947 median. Only one State health officer was receiving less than $7,200 per year in 1951, while 14 were receiving $12,000 or more, including 4 with salaries of at least $15,000.

Medical Personnel

As might be expected, the median salaries of medical personnel (exclusive of State health officers and the directors of the selected health services which were tabulated separately) increased in somewhat the same pattern as the median salaries for State health officers (fig. 2). The increase in median salaries of the medical group was 43 percent during the 5-year period. Although 54 percent of the group were receiving salaries of less than $6,000 per year in 1947, only 3 percent were below the $6,000 level in 1951. The proportion of medical personnel receiving salaries of $9,000 or more increased from 1 percent in 1947 to 38 percent in 1951. Approximately 15 percent of the public health physicians in State health departments were receiving salaries of $10,000 or more in 1951, and 10 were being paid at the rate of $12,000 per year.

Dental Directors

As a group, the dental directors rank next to physicians in the State health department salary structure. The median salary among the directors of State dental public health services increased from $5,400 in 1947 to $8,100 in 1951, an increase of 50 percent in 5 years. The 1951 median salary was $1,000 above the highest 1947 salary. Only 6 of the dental directors were receiving less than $7,000 in 1951, and 2 were receiving more than $10,000. In 1947 the highest salary among dental directors was $7,100, and 14 were receiving less than $5,000.

Environmental Sanitation Personnel

The percentage increase in the median salaries for the directors of sanitary engineering during the period of study was 29 percent; for other sanitary engineers, 20 percent; and for sanitation personnel other than engineers, 56 percent. The lower and upper limits of salaries for the directors moved upward with the general increase in salaries:

1947		*1951*	
Low	$4,250	Low	$5,178
High	11,000	High	12,372

The distribution of their salaries is approxi-

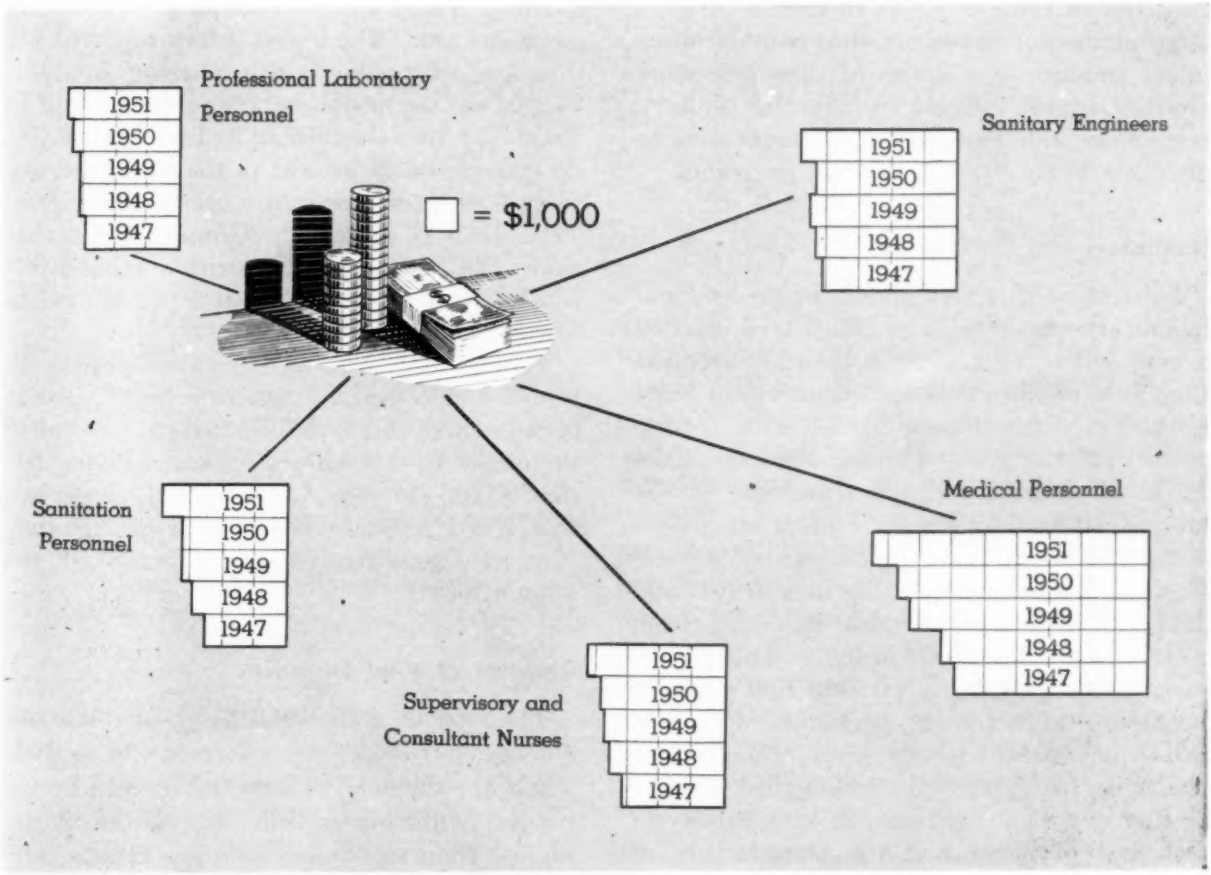

Figure 2. Median salaries of selected groups of State health department personnel, 1947–51.

mately the same as that for dental directors. Another index of the general improvement in salary status of these directors is the shift in the numbers receiving salaries of less than $6,000. The 22 who were in this group in 1947 had been reduced to 4 in 1951. The change at the upper salary limit was less dramatic. At the end of the 5-year period there had been an increase of from only 2 to 5 receiving salaries of $10,000 or more.

A somewhat different salary trend was found among the other sanitary engineers as compared with directors of sanitary engineering. They received the smallest percentage increase of all the groups studied. This was not particularly surprising since the group experienced a considerable numerical increase over the 5-year period. This would tend to depress the median salary because when large numbers of new employees are added to the staff they are generally employed in the lower salary brackets. Even so, the changes in the salary distribution for this group were marked. In 1947 only 15 percent received $5,000 or more per annum, while in 1951, 45 percent were in this category. The change at the $7,400 level is more striking. Only 2 sanitary engineers were above this salary in 1947, but 38 were in this group in 1951. At the other extreme the number receiving less than $3,200 was reduced from 41 in 1947 to 7 in 1951. The medians for sanitary engineers and sanitation personnel were:

	1947	*1951*	*Percent increase*
Sanitary engineers	$4,100	$4,900	20
Sanitation personnel	2,500	3,900	56

The large percentage increase in median salary for sanitation personnel still left the median for this group, dollar-wise, only one step removed from the lowest median rate in 1951. One explanation of the continuing low median rate in the sanitation group is the heterogeneous

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character of the group. It includes relatively large numbers of inspectors who are in the lower salary grades. The duties of these personnel are very diverse, ranging from routine sanitary inspections and food and drug inspections to directing broad State sanitation programs.

Laboratory

Laboratory directors and other professional laboratory personnel are, like the sanitation group, less homogeneous in their composition than most of the other selected groups of State health department employees. The heterogeneity of the group particularly affects the range of salaries and the placement of the median within the range.

Salaries of directors of laboratory services began at approximately $3,600 in both 1947 and 1951, while the upper limit increased from $10,300 in 1947 to $13,475 in 1951. These broad ranges reflect the great variance that exists in the scope of activities performed by State health department laboratories. Their activities range from strictly bacteriological analyses to highly specialized research on a variety of technical problems and the manufacture of biological products. The considerable improvement in salaries in the upper brackets is reflected in a 25-percent median increase from $6,000 to $7,500 in the 5-year period and in the increase from 4 in 1947 to 15 in 1951 of those receiving more than $8,000.

The duties of other professional laboratory personnel vary from the performance of routine serologic tests under supervision to independent and highly technical research investigations. The range and distribution of salaries within this group were similar to the data reported for sanitary engineers and sanitation personnel. There was a continuing low median rate, a more significant change in the distribution of salaries in the lower limits than at the top, and a relatively broad range in salaries.

Public Health Nurses

Probably because the duties and responsibilities within the public health nursing groups vary less than in the other groups included in this study, the range of salaries is relatively narrow. There was, however, a general movement upward. The lowest salary reported for directors of public health nursing in 1951, $4,200, was the median salary for this group in 1947. By 1951 the median had risen to $5,400, an increase of 29 percent in the 5-year period. Only 6 directors received more than $5,000 in 1947, while 17 received less than $4,000 in that year. Thirty-four public health nursing directors received more than $5,000 per annum in 1951.

The increase in the median salaries of supervisory and consultant nurses was 35 percent between 1947 and 1951. In 1947, 81 percent of the nurses in this category were receiving less than $3,600 per year, while in 1951, 90 percent were receiving $3,600 or more. Approximately 17 percent were receiving more than $5,000 per annum in 1951.

Directors of Vital Statistics

The median salary of this group increased from $4,500 to $5,460 or 21 percent between 1947 and 1951—the smallest increase recorded for the program directors studied. In 1947 the salaries ranged from $2,400 to $8,000 per annum, with only 2 receiving more than $6,000 per annum. In 1951 salaries of vital statistics directors ranged from $3,240 to $9,610, with 16 receiving more than $6,000.

Throughout this series the director of vital statistics has been defined as the one in the State health department who had the immediate responsibility for directing the collection of vital records. Salaries of the chiefs of public health statistical units that in five States are independent of the division of vital statistics are not included in this group.

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Impact on the Department of Public Health

of the

San Diego Mass Chest X-Ray Survey

The metropolitan San Diego mass chest X-ray survey was completed in early 1950, but its effects on the department of public health are still being felt. New policies were evolved. Old ones were given new life. Associated gains in cancer and cardiac follow-up, as well as direct gains in tuberculosis control, were made.

San Diego's survey was the tenth in a series of case-finding projects conducted since 1946 in many parts of the country with United States Public Health Service help (*1*). The survey was more than a year in planning and involved, before it was over, the participation of thousands of citizen volunteers and almost all organized groups in the area. In the most intensive health project of its type ever conducted in California, 245,061 70-mm. X-rays were made during an 8-week community-wide tuberculosis case-finding survey.

Many of the benefits of San Diego's X-ray experience are obvious. The survey discovered cases of tuberculosis. It gave an opportunity to bring the "Get an X-ray" message to every part of the community. It gave the entire community a massive exposure to health information, some of which must have been assimilated. It gave all an opportunity to pitch in and work together on one single project of unquestioned importance.

But there were other less obvious results of importance to the total public health program. What was the effect of the survey on case-finding policies and practices of the local health department? How did it affect health department relations with medical groups and other professional agencies? Did it have any effects on other department programs? These are questions of particular interest to the professional public health worker.

The tuberculosis case-finding program of the department had by no means been dormant before the mass survey. An active program had been developed through the use of a permanent diagnostic center in downtown San Diego and a mobile unit which visited other city and county areas regularly. These efforts had developed a considerable volume of work in the follow-up of suspected cases by the time the mass survey began.

New Policies

As a result of the community-wide survey, 5,791 cases were classified "suspected for tuberculosis" following confirmatory film readings. Of these, approximately 800 were followed by the health department, the remainder by private physicians and other agencies. During the planning it was apparent that the health department clinic would experience considerable difficulty in adjusting to the new load of survey cases. Two important changes were made in medical policies regarding follow-up.

It became necessary to be more discriminating in the choice of cases for continuing follow-up studies. Although no rigid criteria were established, many cases which would have been followed longer in presurvey days have been discharged from the recheck clinic. In their review of suspected cases, the clinic physicians have requested that patients with no progressive pulmonary process and no special problems return for recheck at 6-month or

This report was submitted by the staff of the Department of Public Health of San Diego, Calif. J. B. Askew, M. D., M. P. H., is director of the department.

yearly intervals instead of each 3 months for 2 years. At present, a staff committee is developing policies and procedures for our total tuberculosis control program. As soon as time and staff are available, we will probably lengthen the period of observation of suspected cases and increase slightly the number of visits to the clinic for rechecks so that we may eliminate the possibility of overlooking a few active, progressive cases among the suspects.

Laboratory studies on first examinations have been intensified. This was done by adding one more technician to the laboratory staff and by clinic physicians requesting more complete laboratory work on initial visits. This change in laboratory procedures requested on first visits has resulted in more frequent discharge of patients on the basis of negative laboratory findings and, therefore, in a diminished burden upon X-ray facilities. We hope that the more complete laboratory work at the time of the initial visit will mean active cases can be found earlier and more of the inactive cases dismissed.

Impact on Clinic Services

Medical services were improved in two important ways by the mass survey. First, additional clerical staff was assigned and maintained at the clinic throughout the year, making it possible for the professional staff to handle a greater volume of work.

The second important aid to clinic services made possible by the survey was the classification and filing of all X-ray films taken by survey teams. Funds to do this filing job were provided by the California State Department of Public Health. Specific films are now available to physicians on request and are proving a valuable asset to the clinician. For example, 26 cases of tuberculosis have developed in persons who had negative films at the time of the survey. Having the survey film available for study is of obvious value to the physician in estimating the time and stage of infections discovered following the survey. At the same time, this has emphasized to physicians in the community what they already knew, namely, that a single negative chest X-ray does not guarantee that future films will not show active tuberculosis or other significant pathology.

Case Register and Reporting

A central tuberculosis case register has been operated by the department since 1948. However, it had not been developed to its optimum effectiveness before the mass survey. To assist with the registry for the mass survey, the United States Public Health Service assigned to the department a special case registry consultant. This consultant was, during her assignment to San Diego, not only able to improve and maintain the register but also to train a case registry clerk to take over when she left. Thus, because of the survey, this department has been able to have the continued use of an active case register.

Contact investigation was another activity in which improved services could be traced to the survey. In this instance, it was a matter of the increased case load justifying the assignment of clerical help to improve an existing contact registry. This meant better follow-up service given to known contacts as well as to the large additional number of contacts discovered by the mass X-ray survey.

Private physicians diagnosed and reported as active tuberculosis cases 73 of the survey suspects referred to them—approximately one-third of all the active tuberculosis cases found by the survey. In addition, in 1950 private physicians reported 52 active tuberculosis cases found in the course of their normal practice, or approximately as many as they had reported in the preceding year.

As a result, there were, in 1950, 640 active tuberculosis cases new to the health department, or approximately 7 cases per annual death. This high ratio was not due to the inclusion of any appreciable number of inactive and activity-undetermined cases. In fact, 68 percent of the new pulmonary cases had activity demonstrated by the presence of tubercle bacilli.

Tuberculosis case finding was successful in the older age groups, ages 40 and over, as measured by the ratio of newly reported active cases to deaths. In this group there were 5.5 new cases per death. Usually the ratio of new cases per death is very low among the older adults.

In 1950, 88 tuberculosis deaths were reported. Of these, 31 percent had not been known to the health department as active cases before the death certificate was filed. Although this per-

centage was only slightly lower than in 1949, it was substantially lower than in the years preceding 1949.

Nursing Program

The impact of the survey on the nursing program was great. Several months before the survey, staff nurses were offered an intensive in-service education program in which all phases of tuberculosis control were reviewed. At the same time, plans were made to allot as much nursing time as possible to the survey effort. This meant that some nursing services had to be eliminated and others reduced. Among the changes made were:

Routine home calls to all patients with minor communicable diseases have been eliminated. Instead, instructions for the care of patients are sent to the home. At the time that a minor communicable disease is reported by a parent, the clerk inquires if the patient is under the care of a private physician. If a private physician is in attendance, instructions are mailed, but no home call is made. If the patient is not under the care of a private physician and there are siblings under 2 years of age in the family, or there is any other known health problem, a home visit is made.

Changes were made in the city-wide school smallpox vaccination program. Instead of allowing the usual full school term in which to perform this service, the work was condensed into 12 weeks previous to and at the conclusion of the survey.

Districts of all nurses on duty at the mass survey retake center were covered by other members of the nursing staff.

The number of nurses used in prenatal and well-child conferences was reduced.

An expected result of the survey was the involvement of more staff nurses and their time in tuberculosis follow-up activities throughout 1950. From this increased interest in, and knowledge of, the problem of tuberculosis has developed the appointment of a staff committee which is now reviewing all department tuberculosis policies and procedures.

Medical Social Work

The mass X-ray survey provided an opportunity to add the services of a medical social worker to the established medical and nursing program. The medical social worker was assigned by the United States Public Health Service. Public health medical and nursing staffs have recognized for many years that emotional and socioeconomic factors have been paramount causes in developing "uncooperative patients," that is, patients who fail to place themselves under medical care or who fail to complete a treatment plan. No person with specialized training in managing the emotional impact of illness and in the use of social agencies was available before the survey to assist the local staff in meeting these problems. A staff, untrained in these functions and occupied with other professional responsibilities, met the needs as best it could.

The medical social work demonstration has now been in operation more than a year. Medical social services have been offered to all newly diagnosed patients as well as to regular clinic patients referred for special handling of personal problems.

The demonstration has given convincing evidence of the need for qualified case-work service to handle patient problems at the point of clinic contact so that the patient may obtain maximum benefit from medical services. Since the addition of this service the relationship of patients to the clinic and of the clinic to community agencies has improved. With few exceptions, the survey patients newly diagnosed in the clinic have worked out satisfactory plans of medical care. In this same group hospital discharges against medical advice have been reduced to approximately 15 percent, or one-half of the rate in groups whose initial diagnosis was not handled with case-work help. Tuberculosis control is best served by meeting the patient's problems at the time of diagnosis so that he may begin, and continue, a plan of treatment with the assurance that his family's welfare will not be jeopardized.

Although the survey clinic load per month dropped gradually during 1950, the number of cases referred for case-work service remained constant at between 30 to 35 a month. In-

creasingly, referrals are received for services other than medical care, for help in such areas as marital problems affecting the course of illness, planning for children, emotional reactions to illness which have interfered with treatment, and planning for vocational guidance and training.

The evidence accumulated from the medical social work demonstration has indicated a need for additional consideration of the social resources available in the community. Serious gaps in service still exist which deter patients from obtaining needed medical care. The survey has shown a need for research into patients' needs and for the development of community resources so that patients may procure medical care.

Relations With Other Agencies

One of the major after effects of the San Diego mass survey has been the strengthening of the health department's relationships with the city's official and voluntary agencies concerned with the community's health. From the beginning, the survey was a cooperative project of many groups and involved joint planning and joint responsibility for its success or failure. This very fact—that many health agencies worked together on a common problem—increased the understanding of each for the other as nothing else could have. Especially significant were the effects on the health department of relations with medical, nursing, and community citizen groups.

Additional Gains

It was the opinion of the health department staff participating in the survey that private physicians who took part gained an increased understanding of the over-all functions of the department. Physicians recognized that tuberculosis control and follow-up is a job for the department of public health, and the health department staff realized more clearly than ever the role of the private physician in disease control activities. The local medical profession gave its wholehearted support to every phase of the project. Many physicians spent long hours at the conclusion of their own working days serving on medical policy planning committees and X-ray review boards.

The increased case load brought about close cooperation among all nursing services in the community—public health nurses, school nurses, visiting nurses, and private duty nurses. Many nursing groups, not specifically connected with public health activities, assigned members of their own staffs to duty at the X-ray retake center.

The experience of one community group which helped with survey organization was typical of many. In this community, so pleased were the citizens with the survey effort that shortly afterward they asked the department for further assistance in developing other community health programs. It now has an active health committee which has undertaken many activities in the past year and is a staunch friend of the health department. Throughout the entire San Diego area citizens have become more aware of the many ways in which they can participate in programs to improve the health of their communities.

Cancer and Cardiac Follow-up

One of the unique contributions of San Diego to the mass survey concept was the incorporation of provisions for the follow-up of suspect neoplasm and cardiac cases found on the X-ray. Funds for the follow-up program were provided by a special grant from the California State Department of Public Health.

The San Diego tuberculosis control service had always maintained a high index of suspicion regarding neoplasm and was aware of the opportunity presented for early neoplasm case finding through the photofluorogram. But with clerical and nursing staffs already overtaxed by the tuberculosis load, it had never been possible to trace each suspected neoplasm to a definitive diagnosis. The public health nurses working on the newly inaugurated follow-up were available to take rather detailed histories on suspected neoplasm and cardiac cases, and then, with medical supervision, were available to guide the patient to a private physician or other facility for further diagnostic study.

Four hundred and forty-seven suspected neoplasm patients were followed, and 29 have undergone major surgical procedures as a direct result of the survey. These were:

Pneumonectomy	7	Pneumonotomy	1
Lobectomy	11	Thoracotomy for removal of mediastinal tumors	3
Thoracotomy for removal of pericardial cyst	1	Mastectomy	1
Thyroidectomy	5		

Because of the focus of attention upon neoplasm case finding and the experience gained by health department personnel in the survey, a file of all pulmonary neoplasm deaths was set up for 1950, and has continued. It is now possible to check these deaths among those who had survey films. Interesting observations will be possible in the next 12 to 18 months.

Summary and Conclusion

An attempt has been made to review briefly some of the major effects of the community-wide chest X-ray survey in the months following the conclusion of actual X-raying:

1. The health department was able to serve the entire community rather than just specified groups of "indigents" or "contacts." The health department in this new role gained stature, we believe, and began to mean more to everybody in and around San Diego.

2. The health department and cooperating agencies worked out techniques for concentrating their time and energies on tuberculosis for a short period. This kind of increased attention to a specific health problem seems to be extremely productive.

3. Tuberculosis clinic services available to the public were increased and improved.

4. The usefulness of both the tuberculosis case register and the contact register was greatly enhanced.

5. The impact of the survey on the public health nursing staff brought many temporary, and some permanent, changes in nursing procedures.

6. Health department relations with medical, nursing, and community groups were strengthened.

7. Medical social work had an opportunity to prove its place in the health department program.

8. Gains in chronic disease control—cancer, heart disease—were made.

A portion of the health officer's statement which appeared as the final page of the survey report (*2*) may perhaps serve as the conclusion of this article:

"The story of metropolitan San Diego's mass chest X-ray survey which has unfolded on these pages is the story of the greatest concerted attack against disease ever undertaken by our community . . . .

"Just as the X-ray allows us to look inside an individual, the mass survey gave San Diego an opportunity to get a good look at itself attacking a public health problem. It has brought to many homes and to many individuals the realization that the public health is *everybody's* business. Through participation in the tuberculosis program, San Diegans are already beginning to think of other ways in which they can work together."

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A Symposium

On June 22, 1892, Sir James Crichton-Browne, M. D., presided over the eastern counties branch of the British Dental Association in Cambridge. In the course of his remarks [1] he said:

"The late Dr. George Wilson showed that fluorine is more widely distributed in nature than was before his time supposed, but still, as he pointed out, it is but sparingly present where it does occur and the only channels by which it can apparently find its way into the animal economy are through the siliceous stems of grasses and the outer husks of grain, in which it exists in comparative abundance. Analysis has proved that the enamel of the teeth contains more fluorine, in the form of fluoride of calcium, than any other part of the body and fluorine might, indeed, be regarded as the characteristic chemical constituent of this structure, the hardest of all animal tissue and containing 95.5 percent of salts, against 72 percent in the dentine. As this is so it is clear that a supply

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The Dentist's Responsibility

Fluoridation of Municipal Waters

The Study of Mottled Enamel

By Frederick S. McKay, D. D. S.
Colorado Springs, Colorado

At the turn of the century dental pathologists recognized two principal developmental lesions of the enamel. Of the one most frequently occurring—then termed "atrophy"—the etiology was was fairly well understood. For the second, white spots in the enamel, there was no known explanation. In 1906–1907, the occurrence of an identical developmental lesion in practically the entire native population of Colorado Springs was brought to the attention of Dr. G. V. Black. Following a personal examination in 1910, he declared it to be a new lesion in dental pathology and gave it the name of "mottled enamel."

Widespread examinations of similarly afflicted populations showed that the one common factor apparently was the continuous use of the domestic water supply during the years of enamel formation. The waters associated with mottled enamel were derived from almost every conceivable source. However, it was found that

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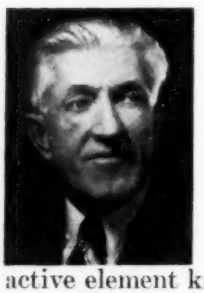
A Chemist's Evaluation

By A. P. Black, Ph. D.
Head, Department of Chemistry
University of Florida



Fluorine, lightest and most active of a family of elements known as the halogens, was first isolated by the French chemist, Moisson, in 1886. It is not only the most active of its family, but is the most active element known, combining directly with all other elements except oxygen and the rare gases. Fluorine is present in most soils and in the bones and teeth of animals. Sea water contains approximately one part per million of the element, and it is present in amounts varying from mere traces to significant concentration in a high percentage of the public water supplies of this country. Fluorine is present in a great many of our human foods, although the average daily intake from food is quite small.

A chemist, H. V. Churchill, in 1931 first called attention to the fact that the water supplies of Bauxite, Ark., Colorado Springs, Colo., Kidder, S. Dak., Lidgerwood, N. Dak., and Oakley, Idaho, all known to produce mottling of teeth,

(*See page 39*)

of fluorine, while the development of the teeth is proceeding, is essential to the proper formation of the enamel and that any deficiency in this respect must result in thin and inferior enamel.

"If, in our dislike to grittiness, which has run parallel to our addiction to soft and succulent food and in our preference for white and fine flour, we have cut off the main source of supply of fluorine to our systems, it is not difficult to understand how we may have thereby incurred comparatively feeble and unprotected teeth, with a diminished power of resistance to adverse influences and peculiarly liable to decay. For the dense close-fitting prisms of the enamel are to the tooth what its armour plates are to a modern ship of war; and if they are easily penetrated, corroded, or worn away, then the fate of the dentine within is sealed. I think it well worthy of consideration whether the reintroduction into our diet, and especially into the diet of child-bearing women and of children, of a supply of fluorine in some suitable

(*See next page*)

From the Annual Session of

The American Dental Association

The Practicing Dentist's Viewpoint

By Milton E. Nicholson, D. D. S.

Associate Professor of Public Health Dentistry
University of Pittsburgh

Fluoridation of municipal waters is now generally accepted as being one of the cheapest and most effective methods available for reducing the incidence of dental caries. Researchers, working independently of each other, have supplied us with so many findings in support of fluoridation that it seems almost basic for all communities to fluoridate their water supplies.

The practitioner can help further programs aimed at prevention and control of dental disease. He frequently does not realize just how important he is in helping to create public opinion. His close relationship with patients and his unique position as an accepted leader in dental health matters in the community enable him to guide dental health thinking of those with whom he comes in contact.

A number of far-sighted dentists and researchers have realized for years that the dental caries problem will never be solved by repair service alone. As a result, many preventive

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A Public Health Dentist's Viewpoint

By F. A. Bull, D. D. S., M. S. P. H.

Director of Dental Health
Wisconsin State Board of Health

To most of us in the dental profession the public health approach to the dental health problem is something new. The fluoridation program has given us the first opportunity to offer a preventative for dental caries which lends itself to mass control in 60 percent of the population.

No other public health program has had, at the time of its introduction, as much scientific data based on human experience. No valid disadvantage or objection to the program has been proved. Successful 5- and 6-year demonstrations in Michigan, New York, Wisconsin, Texas, and Canada were instrumental in bringing about national level approval of the fluoridation program.

But even when there is no real opposition to a public health program the "status quo" is a factor to be reckoned with. Hence, it is important that everyone concerned be given factual information about fluoridation and what it means in terms of improved dental and general

(*See page 40*)

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Symposium

(*from page 37*)

natural form—and what form can be more suitable than that in which it exists in the pellicles of our grain stuffs?—might not do something to fortify the teeth of the next generation."

Today—nearly 60 years later—the vital role of fluorine is well established. First through topical applications and more recently by addition to public water supplies, the dentist, the public health worker, and the public now have at hand practical and effective measures for the large-scale prevention of dental caries in children.

Fluoridation of drinking water is emerging as one of the outstanding public health developments of recent years. Historians may well rank it with the control of typhoid fever, milk-borne diseases, smallpox, and goiter. It represents both a remarkable research accomplishment and a major application of community health principles.

The first mass preventive measure in the field of dental public health, fluoridation requires not only the teamwork of dentists, chemists, engineers, and other public health people, but the active understanding and support of the public as a whole, their elected officials, and their community leaders. The growing number of communities—now more than 120, ranging from towns of 500 to metropolitan areas—which are bringing the benefits of fluoridated water to their children underscores the significance of this community health development.

The importance of fluoridation prompted the American Dental Association to include a symposium on "The Dentist's Responsibility in the Fluoridation of Municipal Waters" in the program for the 92d annual session, held in Washington, D. C., October 15–18, 1951. The four speakers were Dr. Frederick S. McKay, Colorado Springs, Colo., who was honored this year for his pioneering work in the field; Dr. A. P. Black, head of the Department of Chemistry of the University of Florida in Gainesville; Dr. Milton E. Nicholson, practicing dentist and associate professor of public health dentistry, University of Pittsburgh, Pittsburgh, Pa.; and Dr. Frank Bull, director of dental health, State Board of Health, Madison, Wis. The summary was given by Dr. Allen O. Gruebbel, secretary of the Council on Dental Health of the ADA.

By arrangement with the American Dental Association, the four major papers of the symposium are presented here in summary.

[1] Crichton-Browne, Sir James: An address on tooth culture. The Lancet, vol. 2, 1892, p. 6. Quoted by A. P. Black before the American Dental Association, October 17, 1951, Washington, D. C.

Dr. McKay

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very frequently the water in endemic districts came from drilled wells of varying depth.

Three strikingly similar experiences in towns in different parts of this country strengthened the water hypothesis and led directly to the discovery of the presence of fluoride. In two of these towns the domestic water supply had been changed from shallow wells to deep drilled wells; in the third town the change had been from shallow wells to water from a warm spring. In each instance mottled enamel became endemic in children born subsequently, whereas prior to the change the condition was unknown. H. V. Churchill, chief chemist of the Aluminum Company of America, found in 1931 that the fluoride content of the deep-well water at Bauxite, Ark., was 14 parts per million, an extremely high content which was reflected in the general severity of the mottled enamel in the population. Examination of water from other communities in which mottled enamel was endemic revealed fluorides. Similarly, water from communities in which there was no mottled enamel were found to be free of fluoride, or practically so.

It soon became apparent that invariably the caries experience rate among the natives of fluoride districts was remarkably low, even when the degree of dental fluorosis was pronounced or even extreme. The first examinations to determine this relationship were made in Wisconsin and other parts of the midwest by Bull, Dean, Arnold, and others.

The exhaustive and brilliant research conducted by Dean and co-workers over a wide territory not only confirmed beyond question the fluoride-low caries hypothesis, but also established that the safe and effective fluoride content is around 1 part fluoride in a million parts of water. As the fluoride content passes 1.5 parts

per million or approaches 2.0, the probability of producing a disfiguring fluorosis increases.

Studies in recent years indicate that the caries inhibitory action of fluoride extends well into middle life and that it is not necessary to continue the use of fluoridized water after the enamel has been calcified.

The average number of decayed, filled, and extracted teeth among the natives of fluoride communities is about three, at an average age of 25 years. And one third or more of the native persons are caries free.

During the decades of study by dentists and research workers to find a means of preventing the initial lesion of caries, the effort seemed to have concentrated on altering the environment of the teeth. On the contrary, the action of fluoride affects the structure or character of the teeth themselves. When caries occurs in fluorosed teeth it is virtually limited to the fissures and pits. Caries of the proximal surfaces of the anterior teeth is almost negligible.

In summing up, it can be emphasized that the integrity of the structure of the enamel is determined only during the period of calcification and not thereafter; fluoride is the only known agent ordinarily included in the diet that is capable of exercising a mass control of dental caries.

The practical application of the findings in this study has led us into the fluoridation of public water supplies, and the impact on public health and the future practice of dentistry cannot at present be completely evaluated.

Dr. Black

(from page 36)

contained fluoride. Though Churchill carefully stated that, because of the few samples examined, his work could not establish a definite correlation between the presence of fluorides and the production of mottled enamel, his report immediately focused attention on fluorides in water, and the connection quickly became apparent. Churchill asked what physiological effects may be produced by fluorides in water. The answer—the reduction of the incidence of dental caries—promises to be one of the landmarks in the history of public health, not only in this generation but in this century.

The first and still the most widely used material for fluoridation is sodium fluoride, which in its pure form is a white crystalline salt with a relatively high solubility constant over a wide temperature range. Because of its suitability for feeding in solution in small volumetric feeders, it is used in the majority of smaller installations throughout the country. A somewhat less expensive agent, used in larger installations, is sodium silicofluoride.

Dean reported in 1933 that fluoride concentrations of not more than 1.0 to 1.5 parts per million were not significant in the production of endemic dental fluorosis. Thus when the preventive effect of sodium fluoride became apparent, it was suggested that this dosage be used. A special committee of the American Water Works Association pointed out in 1949 that climatologic conditions might prove to be important since they govern to some extent the water intake of the individual. Evidence continues to accumulate, and it is now believed that a dosage of 0.7 part per million is sufficient to provide the necessary protection in regions where the mean annual temperature is above 70° F.

The mechanism of caries prevention is particularly difficult to determine, since the difference, if any, between the fluorine content of sound and carious teeth is very small. Armstrong and Brekhus have stated that the enamel of carious teeth contains less fluorine than the enamel of sound teeth. However, McClure has recently reported that the dentine and enamel of several hundred sound and carious teeth with no evidence of fluorosis, which were obtained from nearly 100 individuals, did not differ in fluorine content with any regard to their carious or noncarious history. Many workers have shown that the fluorine content of teeth exhibiting mottled enamel is higher than that of normal sound teeth.

Dr. Krasnow of the Guggenheim Dental Clinic observed that the protein concentration in the saliva from patients with dental caries was definitely higher than in saliva from caries-free patients. Investigators in the Zeller Memorial Dental Clinic at the University of Chicago, employing the germ-free technique, found that a group of 13 white rats living on a normally carious-producing diet for 137 to 150 days experienced no caries in the absence of

microbic life. The control group, fed the same sterilized rations but reared under normal laboratory conditions, had a caries experience of approximately 97 percent. These results appear to support those who maintain that dental caries is associated in some manner with the bacterial flora of the mouth. If that is true, the now demonstrated preventive effect of minimal concentrations of the fluoride ion in drinking water becomes all the more impressive.

Dr. Nicholson

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methods have been subjected to experimentation and some have proved of some worth. Dietary and nutritional habits, proper use of the toothbrush, reduction in intake of refined starches and sugars, good operative procedures, and topical applications of fluorides have all been demonstrated to be good preventive methods. These are in the same category as fluoridation of municipal waters, the only difference being that never before has there been a method devised as cheap, as simple to administer, as effective, and as far reaching as fluoridation.

The practicing dentist can be very proud of his contributions to society in alleviating and eliminating pain, in repairing and restoring impaired or lost dental function, and in helping to develop the operative techniques and procedures associated with an improved treatment service. In the modern conception of health service, however, these contributions are not enough. Each practicing dentist, in addition to being a good operative dentist, must thoroughly ground himself in preventive and control service as well. As a highly specialized individual he must exert all his efforts toward solving the dental health problem.

All practicing dentists must realize the seriousness of the dental health problem facing the public and the profession. Preventive and control methods are the only logical approach to the problem, since we will never be able to keep pace with the present rate of dental caries. The incidence must be reduced appreciably. All proved methods of reducing the incidence of dental caries, especially the fluoridation of municipal waters, must be given serious and continuous consideration.

Even though he may not realize it, the practitioner has a large stake in dental public health. Raising the standards of dental health in his community is certainly one of the obligations of a dentist. When a patient wishes to discuss the fluoridation process, the dentist should use the facts readily available to him rather than evade the issue with faint praise. By so doing he will take the lead in preventing misunderstanding and confusion. He will also be instrumental in bringing to his community one of the best procedures yet discovered for the control of dental caries.

Dr. Bull

(from page 37)

health by reducing caries attack rates 60 percent in children. Most communities have an earnest desire to improve the health of the public, but they are fearful of adopting some program which might eventually prove to be a boomerang.

There has been some complaint that the dental profession has done little to prevent dental caries on a public health basis.

The local dental society is the dental authority in any community, and the local dentists, with assistance from the State dental society and State department of health, must take the initiative in following through on a fluoridation program. They must assume the same leadership, courage, and persistence that was shown when earlier public health measures were inaugurated.

From a public health viewpoint fluoridation has many local features which are necessary for a successful community health program.

1. It can be carried out in its entirety through existing facilities.

2. It requires no special effort or participation on the part of the individuals of a community.

3. The reduction in dental caries (65 percent) is great enough to warrant its adoption by the community.

4. The cost of the program is so small that it can easily be justified in any community.

5. There are no known objectionable features to a program of water fluoridation.

6. It is a program which can be readily understood by the community.

7. Fluoridation has been in actual operation

long enough (6 years) to prove that the mechanics and controls are accurate and simple and that the dental health benefits obtained with controlled fluoridation equal natural fluoridation.

One thing must be guarded against in the fluoridation program. That is the belief that once the communal water supply has been fluoridated the whole dental health problem has been solved. Nothing could be further from the truth. It will take about 14 years after a community starts fluoridating before a two-thirds reduction can be made in the caries attack rate of all children. And even after fluoridation has been carried on for a long period of time, one-third of our present dental decay rate will still be with us.

It is our obligation to see to it that all communities fluoridate their water supplies. It is likewise our obligation to see to it that all communities have an adequate dental health program and utilize all dental health measures which will improve dental health. The *American Journal of Public Health* aptly summarizes the fluoridation program in these words, "What are we waiting for?"

Entomologists Discuss Radioactive Houseflies

The byproducts of atomic energy are now aiding entomologists in tracing the complex chemical and biological processes of insects, and also to enhance their studies of insect behavior, such as the flight range of the common housefly. Scientists of the Communicable Disease Center, Public Health Service, are using radioisotopes to mark flies for identification when later recaptured.

The housefly was described as a hobo with a cruising range of 8 miles or more, the meeting of the American Association of Economic Entomologists in Cincinnati, December 11, 1951, was told. Flight-range studies, important in measuring the insect's role in disease transmission and in planning effective control operations, were reported by Dr. H. F. Schoof, of Atlanta, Ga., R. E. Siverly, of Phoenix, Ariz., and J. A. Jensen, of Savannah, Ga., who made their experiments in Phoenix, and by K. D. Quarterman, W. Mathis, and J. W. Kilpatrick, all of Savannah, who collaborated on tests in Georgia.

For the flight-range tests, the flies are tagged with an extremely tiny amount of radioactivity, less than one finds in a radium watch dial, and so little that it is harmless to man. A counting device is used to isolate the "hot" flies upon recapture. By its use 10 radioactive flies can be isolated from 50,000 flies in less than 5 minutes.

The flight-range studies have shown: More than 80 percent of flies captured were trapped within 1 mile of the release site, thus indicating major movement in a restricted area; flies appear to move at random from any given site, being attracted by food and breeding materials, called "attractants"; and flies naturally find some areas more attractive than others, hence there is a mass movement toward those areas. Fly control programs are stressing the removal of breeding sources through sanitation. This is pointed out by the recapture in a city market of flies released in a substandard residential area where unsanitary privies were prevalent.

By DOUGLAS McGREGOR, Ph. D., LL. D.

Leadership and the Conditions of Organizational Effectiveness

At the regular semimonthly general staff meeting of the Public Health Service in Washington on November 2, 1951, Dr. McGregor, since 1948 the president of Antioch College, Yellow Springs, Ohio, discussed current concepts of leadership. First full-time psychologist on the Massachusetts Institute of Technology faculty, he was executive director of its industrial relations section. He is considered a leading consultant in human relations and has arbitrated many labor disputes.

A condensation of the major portion of this informal talk is presented here. Dr. McGregor characterized his remarks as a "highly tentative" probing into the question of leadership, and as a basis of further discussion.

The subject of leadership comes up quickly in almost any discussion of organization problems and human relations. The typical question focuses on the leader, and along the line of what is a good leader. In so doing, we direct our attention to the personality characteristics of an entity, the leader.

I suspect there is no answer to be found along this line of questioning—that there is no such thing as a good leader per se, but that a wide range of personal characteristics is required for leadership in different situations. Even in the same situation people with startlingly dissimilar characteristics can be successful as leaders.

Certainly one sees that sort of thing in industrial settings often enough to be convinced—or in a church, or in an army in the field, or with a football team. It seems clear that quite different characteristics are called for in a leader, depending upon the nature of the organization, its philosophy, its purpose, and the like. And so I'm inclined to conclude that to seek for the personal characteristics which typify the leader is a fruitless search, and that we ought to be asking ourselves questions of another order altogether.

To approach it another way, let's start with what offhand seems a trite statement: The effective leader is one who is followed. To say that, however, is similar to saying: A good medicine is one which cures the disease. Having said it, you don't start out to try to find the characteristics of a good medicine independent of the disease you are attempting to treat. And I think that's the important point. We shouldn't seek to study leadership without regard to the situation in which we find it exhibited.

Purpose of Organization

Having changed our orientation, we ask different questions: What is an effective organization of people? How does an organization achieve its purpose, whether its purpose be profit-making, education, or government service?

There are two very broad generalizations that I think are pretty well substantiated now. In our culture, at least, we find an organization effectively achieving its purpose only when the members are willing to collaborate for a common end. We've pretty well passed the point where we think we can make people do a job.

The other generalization is that people collaborate willingly toward an organizational goal only when in so doing they are able to satisfy their own unique personal needs. There are a great variety of these needs which are often in conflict, and are often a good deal more subtle than the needs satisfied by the pay check. But, basically, when people discover that through working together toward an organizational goal they can get what they want, we find effective collaboration.

Both the purposes of organizations and the needs of the people who comprise them change. As a result of such changes the leadership which will be effective will be different. When the problem is set in terms like that, it becomes clear, for example, why a militant demagogue may be a very effective leader during an organizational drive of a union, and why, 5 years later, when the union has achieved status and is perhaps in reasonable relationship with the employer, the man is no longer an effective leader.

The Situation and Leadership

In some situations we find members of a group have a very clear purpose which is common to the group. The satisfaction of their needs relates very directly and immediately to that purpose. Think of a hobby club in which the members seek satisfactions that are directly related to their purpose. The same thing often tends to be true of a group that finds itself in a critical situation. The purpose of the group and the commonality of need makes for a very simple and straightforward situation. A football team presents this situation. The objectives are simple; the group is committed to the objectives and their needs are satisfied through achieving them. There, however, conflicting needs between winning the game and being a star personally sometimes complicate the leadership problem. But in those situations, the leadership requirements for effective organizational achievement are on the whole pretty simple—someone who is a resource to the group, a natural leader, is about all that is needed.

There's been a great deal of experimentation with such small groups in a laboratory setting. It seems possible for the group to be extremely effective with no leader at all, with functions distributed among the members and nobody thought of by the group as being their leader. But in most situations that we have to deal with, the group doesn't have a clear and unified purpose, and there are many complex and often conflicting needs among the members. Then the leadership task becomes extremely difficult.

Correlates of Success

Take, for example, an industrial organization. Its purpose, basically, is to make money. That purpose is established by the owners, who are in one sense external to the group. The leader is usually appointed from outside, or perhaps he is the owner and is thus self-selected. He isn't a natural leader who emerges from the group. He isn't elected. He's not ordinarily seen as a resource by the group, and he has to deal with a wide variety of needs, conflicts in purpose, and so on.

That is a typical situation in which we attempt to study leadership. Public health organizations, in somewhat different terms, present similar problems. Let's raise the question, then, What are the significant conditions, the significant correlates of organizational success?

This is not a question now about leadership at all. We are not looking for the characteristics of a person, but rather for the factors which are correlated with the achievement of the organization's purpose and with high morale—that is, the satisfaction of the needs of the members of the organization. I believe there are correlates. Independent observers and in-

dependent researchers here and there and everywhere are beginning to point toward certain things which do seem to be common.

Negative Factors

It is pretty clear now that the achievement of an organization's purpose does not require all sweetness and light. Many of the writers in this field in previous generations were dubbed sweetness-and-light experts because the emphasis was on "good organization means everybody loves everybody else," and there never is any argument, never any quarreling, never any disagreement. The actual fact is, I believe, that when you get that kind of an organization, you have an organization which is dead on its feet. Only when there is honest disagreement, and sometimes fairly open conflict within an organization, does it move, grow, and develop—assuming, of course, that conflict is not carried to the point where it interferes with organizational effectiveness.

The second negative factor is that no set of personnel policies, procedures, or systems will in themselves create organizational effectiveness. We Americans love gadgets, and we love them just as much in the personnel field as we do in the kitchen. Somehow we appear to feel that if we get enough of these into a complex system, they will make for effective organization. It is not that good personnel procedures aren't important and helpful, but we can't rely on them alone to produce organizational success.

Positive Factors: Organizational Philosophy

On the positive side there are at least four general conditions of effective organization. Foremost, I would put an organizational philosophy—a way of thinking, a way of life which permeates the organization. There must, at least, be acceptance throughout the organization of its goals. There needs to be some accepted and common attitudes about the task of the organization, recognizing that the task is accomplished by and through people. Perhaps this seems trite, but it's surprising how often it is assumed somehow that if they "get out the production," that's the important thing. Effective organization demands that good human relations and high production somehow be reconciled, for we accomplish everything we accomplish in an organization only through people. There needs to be, in short, a realization that the problems of human relations are everyone's job in the organization and are central to the accomplishment of the organizational purpose.

Part of this philosophy, I think, also consists of some attitudes about people—respect for the individual personality and his dignity, confidence in the potentialities of people. So often there is practically an assumption that "we in management" are elite, and that "those stupid bums" on the line maybe can get along, but they haven't anything to contribute other than what they can give with their hands and their muscles. Yet we discover over and over again, when we put it to the test, that even the lowliest worker sometimes can know more than even management about some things.

There is the example of "Big Ears" Boyer who volunteered to reconvert some large equipment in a steel plant with the aid of a plumber's helper and a little material and save the company a lot of money. When finally, through pressure from the union, he was permitted to try the experiment, he made the change at a cost of $700 as against a bid of $35,000 from an engineering firm. The point is simply that we tend to underestimate the capabilities and the potentialities of what we think of as the "simple" members of the mass in our society. An organizational philosophy which accounts for these potentialities, which includes genuine belief in people, is imperative to successful organizational operation.

Mutual Confidence and Trust

As a second positive condition for organizational effectiveness I would put a necessity for mutual confidence and trust between the members of the organization. Here we often assume that people who literally hate each other can somehow work effectively together in an organization. It's possible, of course, to dislike the behavior of an individual without hating him. We find, in the parent-child literature, the point stressed over and over again that you

have to love your children, but that doesn't mean you have to love everything they do.

I think the same thing is true with any type of organization relation. But when you have a face-to-face relationship with persons—just as in a family—and some of those persons literally hate each other, there is no practical way of getting organizational results. There is only one answer and that is one or the other of those has to get out. Without mutual confidence and respect, it is hardly possible to have an effective organization.

Communication That Works Both Ways

A third essential is genuine two-way communication. More and more, it's becoming apparent that communication within an organization has a great deal to do with its effectiveness and success. People need to understand what goes on, above and below. People need to have the opportunity to talk out the things that are troubling them.

Industry spends a lot of time and millions of dollars on communications devices—conference programs, letters from the President, all kinds of placards, and so on—largely to teach the workers, as they say, "the facts of economic life." This communication is, usually, strictly one way. Consequently, the dollars spent on communication are sometimes not merely wasted, but they have a negative effect, rather than a positive one. You must have communication both ways for an effective organization.

Personal Satisfaction on the Job

Finally, as a requirement of an effective organization, we return to this matter of personal satisfaction. There must be conditions which make possible what I'd like to call satisfaction on the job. It's a very interesting fact that most of the rewards which come to people in organizations are rewards which they can utilize only when they leave work. You can't spend your pay at work. The only value it has in terms of satisfaction at work has to do with whether you get more or less than somebody else. Benefits, such as insurance, recreational programs, annuities, vacations, and so on down the list, are utilizable for personal satisfaction, in general, when you go elsewhere.

The result is that many times work becomes a kind of punishment that we undergo in order to have satisfaction elsewhere. I don't believe it's possible to have effective organization under such circumstances. I think we must find ways to make work itself a satisfying kind of experience for people. It's interesting to see how much energy people put into sports and hobbies, and plain hard work outside. It isn't a matter of getting people to work; they'll work if there's satisfaction in it. The problem is finding ways to make the work itself satisfying—to make it not a kind of punishment, but a pleasure.

Significance of Personality

Undoubtedly there are a great many other factors which influence the effectiveness of a human organization. Undoubtedly, as we go on studying and as the research piles up, different emphasis will be placed on the factors I've described, and there will be different interrelations among them. Those I have mentioned appear to me to be significant today.

Now, if you will, note that all of the things I have described are dynamic, not static. These are functional relations within an organization that change with the organization's nature and history. Where does the leader come into that setting?

Except in a very small and probably somewhat unique organization, it certainly seems that these conditions tend to be the results of the efforts of a person or persons whom we look at as the leader. Let me illustrate: Two or three years back, the National Planning Association undertook a series of case studies in about 15 industrial plants looking toward answering the question: What are the causes of industrial peace under collective bargaining? Some of these have already been published, and a final report is anticipated.

I think those of us on the research committee were convinced when we started that we would find that the effective conditions emerging from these studies had little to do with the personality of the individual who happened to be the president or the key executive in the or-

ganization. As we now analyze these studies, it is apparent that the successful situations bore no relation to the personal characteristics of the particular leaders. But one thing is very clear: In every one of those case studies, some individual, usually the president or a key member of the top executive group, seems to have been a critical factor in what happened.

The successful labor relations were not achieved independently of a person, but the personality of that individual and his particular characteristics don't seem to have been particularly significant. Size, the complexity of the organization, the difficulty of relating the purpose of the organization to the needs of the members—and I think the psychological need for a parent-symbol—all of these appear to make necessary the presence of a person who somehow coordinates, stimulates, and interrelates the variables that we're talking about.

The Role of the Leader Is Important

So the role of the leader, as I see it, is important. Perhaps, in some circumstances, it can be shared, as in a small hobby group. Perhaps some day, with more knowledge, more skill, or with a different cultural pattern, the role of the leader can be spread through an organization to the point where the person isn't as essential as he is when we think of leadership today.

The important point I would like to stress is that it isn't the nature of the leader but the nature of the relations between organizational goals and human needs. Those essential relations are the important factors which determine the success of an organization.

In summary, understanding the nature of effective leadership is not a matter of a search for personality characteristics. More pertinent questions are: What are the conditions of organizational effectiveness . . . how does an organization achieve its purpose? When we look in that direction—taking into account the need for willing collaboration and the need for personal satisfaction—the functional relations between those variables become the focus of attention.

Conditions of Effectiveness

Then, the conditions of organizational effectiveness—at least a few of them—are things like these: First, negatively, it doesn't require sweetness and light, and it doesn't require any particular set of systems of personnel administration. We can find, incidentally, organizations that have common patterns of personnel systems at opposite extremes in terms of the health of their human relations.

On the positive side the conditions include (*a*) the presence of an organizational philosophy which permeates the organization with goals that are at least accepted by the majority of the members and with certain attitudes about the task to be performed, particularly stressing the importance of the human relations side of that task, and with certain attitudes about people which take account of them as human beings with genuine potentialities, with unique personalities, and with human dignity; (*b*) mutual confidence among individuals within the organization; (*c*) genuine two-way communication; and (*d*) opportunities for satisfaction at work in the job situation.

Therefore, leadership to me is a set of dynamic functional relations between organizational purposes and the need for satisfaction of its members. The establishment and the coordination of those relations in most complex organizations seems to require a person, a leader. That may not be an inevitable requirement. But it is fruitless to seek a "leader type," or to seek characteristics which will be found in the effective leader regardless of the organization's conditions and of the needs of the organization's members.

Occupational Health

Beginning this month, the Public Health Service's technical magazine *Industrial Health Monthly* is being published under the title *Occupational Health*. $1 a year from the Superintendent of Documents.

Observations on the Epidemiology of Poliomyelitis

By W. THURBER FALES, Sc. D., and MATTHEW TABACK, A. M.

Some evidence to support the theory that poliomyelitis is spread from person to person is found in a study of the 1950 poliomyelitis epidemic in Baltimore City.

The 212 cases of paralytic poliomyelitis reported to the city health department during 1950 represent the highest annual total of reported cases ever recorded in Baltimore. The attack rate of 22.5 per 100,000 during 1950 was exceeded only once when 206 cases were reported in 1916—a rate of 33.9.

This comparatively high incidence offered material for a study of the probable mode of transmission of this disease and of its selection of specific population elements.

However, until we have reasonably accurate estimates of the incidence of newly acquired infections, conclusions drawn from a study of paralytic cases only are limited and incapable of yielding a clear definition of the epidemiology of poliomyelitis.

History of Poliomyelitis in Baltimore

Baltimore City has no record of poliomyelitis mortality or morbidity prior to 1912. Cases and case rates for each 5-year interval from 1912 to 1950 are given in table 1. Annual incidence and mortality ascribed to poliomyelitis are shown in the basic table 9. Recognition of this disease and reporting practices presumably are quite different today than they were several decades ago. Since 1934, when nonparalytic cases were specifically excluded, extreme annual variations in incidence have occurred. The number of cases have varied from 3 to 212 and the case rates, from 0.32 to 22.5 per 100,000 population. No clear-cut time sequence can be developed on an annual basis. When attack rates are considered for white and Negro segments of the population, reported morbidity among Negroes is consistently, but not markedly, lower than that recorded for white persons.

Table 1. Annual average number of reported cases of poliomyelitis [1] for white and Negro persons by 5-year periods, Baltimore City, 1912–50

Period	Annual average number			Number per 100,000 population		
	Total	White	Negro	Total	White	Negro
1950	212	169	43	23.3	22.7	19.0
1945–49	34	29	5	3.6	3.9	2.5
1940–44	57	51	6	6.2	7.0	3.3
1935–39	26	22	4	3.1	3.2	2.5
1930–34	15	13	2	1.8	1.9	1.4
1925–29	41	37	4	5.2	5.7	3.0
1920–24	66	58	8	8.8	9.1	6.8
1915–19	71	(2)	(2)	11.5	------	------
1912–14	9	(2)	(2)	1.5	------	------

[1] Since 1935 only paralytic cases are included in this table.
[2] Not available.

The epidemic of 1950 was preceded by a 5-year period of comparatively constant incidence. The average annual number of cases was 34, and the corresponding rate was 3.6 per 100,000. During this period, the case fatality ratio was 8.9 percent. Previous years of high incidence were 1944 and 1941. It is essential to recall also that the extraordinarily high birth rates from 1945 to 1949 added to the population approximately 100,000 young children—10 percent of the entire population.

Dr. Fales is director of the statistical section and Mr. Taback is director of the bureau of biostatistics, Baltimore City Health Department.

Epidemic of 1950

Distribution of paralytic cases reported for 1950 according to week of onset shows September 3 as the median point for the whole population (table 2 and fig. 1). There is remarkable uniformity in the curves for white and Negro segments. The median points are September 6 and August 29, respectively.

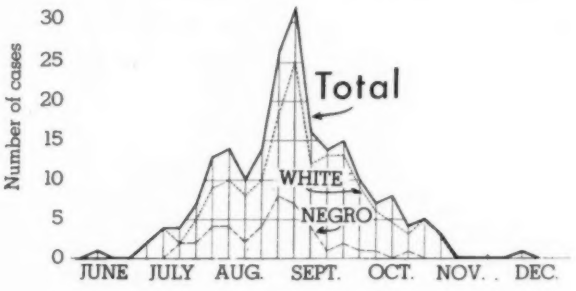
Table 2. Reported cases of paralytic poliomyelitis by week of onset for white and Negro persons, Baltimore City, 1950

Month and week		Total	White	Negro
Total		212	169	43
June	1			
	8			
	15	1	1	
	22			
	29			
July	7	2	2	
	14	4	4	
	21	4	2	2
	28	7	5	2
August	4	13	9	4
	11	14	10	4
	18	10	8	2
	25	14	10	4
September	1	26	18	8
	8	32	25	7
	15	16	12	4
	22	14	13	1
	29	15	13	2
October	5	10	9	1
	12	7	6	1
	19	8	8	0
	26	4	3	1
November	2	5	5	
	9	3	3	
	16	2	2	
	23			
	30			
December	7			
	14	1	1	
	21			
	28			

The range of the curve for the total population extends from July 1 to November 16. If consideration is confined to the weeks of excessive incidence,[1] the epidemic range extends from approximately July 29 to October 19, a period of 12 weeks. Thus, the hypothesis of a common source single-exposure epidemic is inconsistent with the distribution of cases by time of onset of disease, since the epidemic course extended beyond 35 days (*1*)—the extreme estimate of the incubation period for poliomyelitis.

It is the practice of the bureau of biostatistics in Baltimore to spot cases of poliomyelitis on a city census tract map according to the residence of the patient. During the 1950 epidemic, there was a gradual movement from the hub of the city to the periphery in the time sequence in which cases were reported. This movement is shown in a series of spot maps in figure 2 and summarized in table 3.

Figure 1. Reported cases of paralytic poliomyelitis by week of onset and population segment, Baltimore City, 1950.



The median date of onset, a convenient index of central tendency, falls on August 25 for the cases in the center of the city. It was 3 weeks later (September 15) before the median case was attacked in the periphery of the city. A test of this difference indicates the improbability that it was caused by chance. The observation of a significant time differential in the case distribution for specified city areas makes it extremely unlikely that the disease process was associated with exposure to a common source.

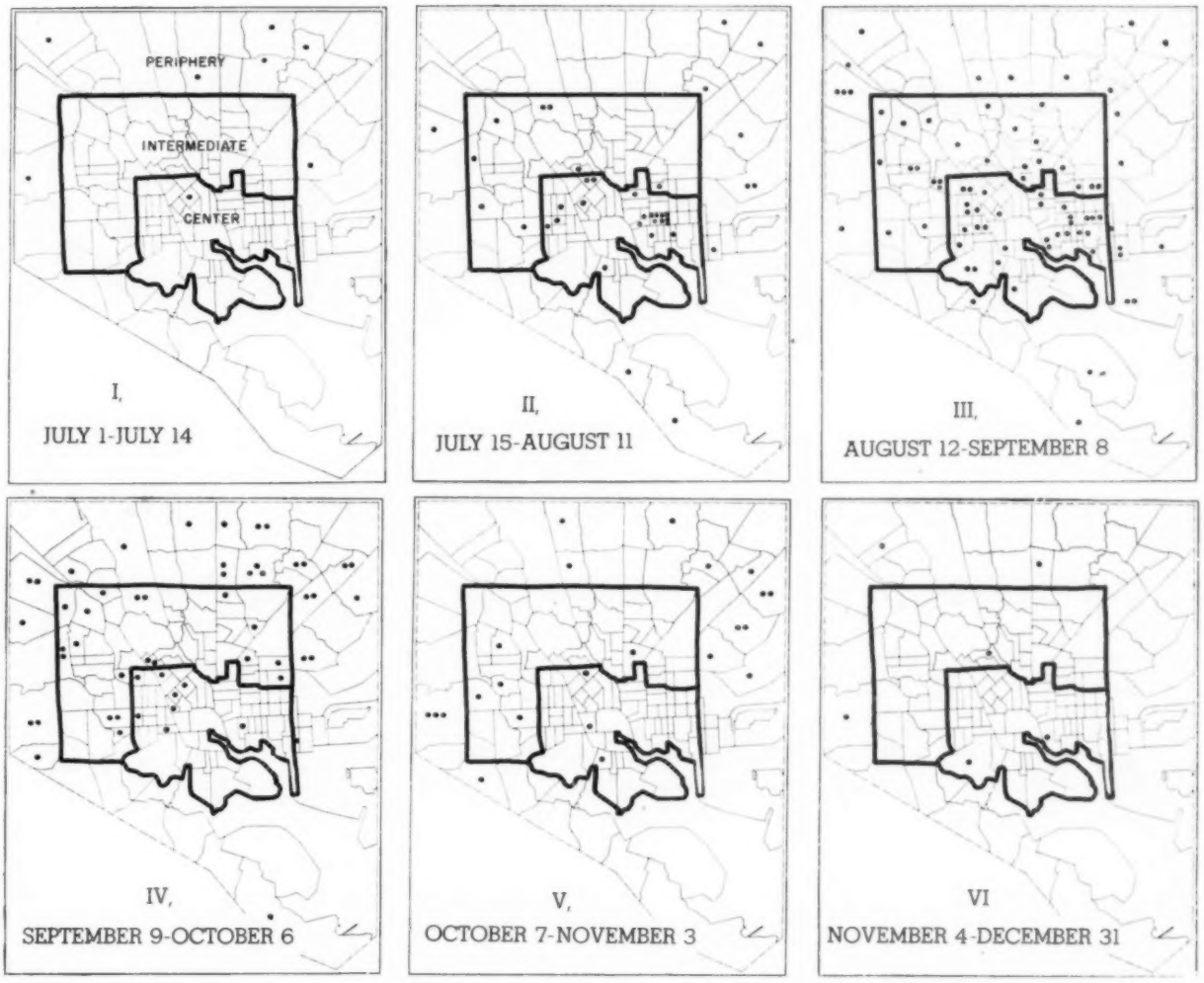
Mode of Transmission

Having rejected a common source as a probable mode of transmission, is there any evidence which would be consistent with a hypothesis that poliomyelitis is a propagated epidemic?

An analysis of the spot maps in figure 2 indicates the presence of a sporadic distribution of cases throughout the city during the early phase of the epidemic period. However, one

[1] Median weekly frequencies based upon experience during 1945–49 were used to determine the interval during which poliomyelitis was present at above-average levels.

Figure 2. Cases of paralytic poliomyelitis according to broad city zones and date of onset, Baltimore City, 1950.



then observes a variable rate of progress in specified zones. The most rapid spread in time occurred in the central area of the city and the slowest development, in the peripheral zone.

The data presented on time differentials in the progress of the epidemic in selected city zones is explainable by the logical thesis that opportunities for interpersonal contact are somewhat less in the peripheral areas as compared with the central zone of the city. It

Table 3. Cases of paralytic poliomyelitis according to geographic zones and month of onset, Baltimore area, 1950

Area	Total	January–June	July	August	September	October	November	December	Date of median case
Intracity zones:									
Center	67	1	10	28	23	3	2	0	Aug. 25
Intermediate	60		2	22	27	8	1	0	Sept. 8
Periphery	85		7	20	32	22	3	1	Sept. 15
Baltimore County [1]	90	1	6	14	35	26	8	0	Sept. 22

[1] Dr. William Warthen provided the morbidity experience for paralytic poliomyelitis in Baltimore County, an area completely surrounding the peripheral zone of the city. The incidence distribution assumes a time sequence similar to that experienced in the adjacent city zone.

Table 4. Total cases and annual average attack rates for poliomyelitis, Baltimore City, 1938–42

Economic group	Age group (years)				
	Number of cases (5-year total)				
	Total	0–4	5–9	10–14	15 and over
Total	131	43	44	22	22
Lower [1]	55	27	18	7	3
Upper	76	16	26	15	19
	Annual average cases per 1,000,000				
Total	30. 4	153	150	65	6. 6
Lower	32. 0	207	134	45	2. 4
Upper	29. 4	107	169	85	8. 6

[1] Includes 40 percent of total population.

follows, then, that the disease is a slower moving process during a given period in areas characterized by low contact rates; it exhibits also a retarded attack sequence by age.

An analysis of attack rates by age for 1950 according to areas of the city cannot be made at present in the absence of population data. However, when the 5-year experience of 1938–42 is distributed by age and broad socioeconomic zones, the earlier attack of a densely settled population is evidenced by the fact that peak rates are at the age range 0–4 as compared to a peak of 5–9 in a less densely populated segment (table 4). The correspondence in total attack rates is evidence of an infectious process which eventually reaches an entire population group.

Table 5. Annual average attack rates [1] by age, Baltimore City

Period	Age groups (years)				
	Total	0–4	5–9	10–14	15 and over
1928–32	41. 6	232	180	52	3
1938–42	30. 2	143	150	65	7
1948–50	105. 0	373	413	227	29

[1] Per 1,000,000 population.

Table 6. Annual average attack rates by age expressed as percentages of rates for 0–4 years, Baltimore City

Period	Age groups (years)			
	0–4	5–9	10–14	15 and over
1928–32	100	78	22	1. 3
1938–42	100	105	45	4. 6
1948–50	100	111	61	7. 8

Table 7. Cases, case rates, and percentage distribution of paralytic poliomyelitis by age for white and Negro persons, Baltimore City, 1950

Group	Total	0–4	5–9	10–14	15 and over
	Number of cases				
Total	212	85	64	21	42
White	169	60	53	19	37
Negro	43	25	11	2	5
	Cases per 1,000,000 population				
Total	225	833	967	375	59
White	233	800	1, 060	415	64
Negro	190	890	680	135	
	Proportionate distribution				
Total	100	40	30	10	20
White	100	35	30	11	22
Negro	100	58	26	5	12

Further support for the person-to-person contact basis for transmission of poliomyelitis is given by Turner and his associates (*2*) in a study on the age incidence of infection by Lansing poliomyelitis virus. These investigators, working with the Lansing strain of poliomyelitis, find that the distribution, according to age of positive Lansing neutralization tests, shows a general similarity to cumulative age distributions for such conditions as measles, mumps, chickenpox, and whooping cough—all

Table 8. Reported cases of paralytic poliomyelitis by type and age, Baltimore City, 1950

Type	All ages	0–4	5–9	10–14	15 and over
Total	212	85	64	21	42
Bulbar	35	7	15	5	8
Bulbar spinal	7	2	2	1	2
Spinal	170	76	47	15	32
Percent bulbar	17	8	23	24	19

Table 9. Poliomyelitis cases by month of report and total deaths, 1912–50, Baltimore City

Year	Total deaths	Total cases	January	February	March	April	May	June	July	August	September	October	November	December
1912	6	25								13	8	4		
1913	1	2			1				1					
1914	1	1								1				
1915	5	26						1	11	13	1			
1916	70	206			2				3	37	71	74	17	2
1917		2							2					
1918	5	38			1			8	11	7	8	3		
1919	28	83					1	2	9	27	26	16	7	1
1920	4	15	3	1				3	1	2	3	1	1	
1921	22	148	1	1				3	12	37	40	41	11	2
1922	3	26	1	3				2	3	2	5	4	5	1
1923	1	11	2	2		3			1		2		1	
1924	10	131	1	1		1	1	2	13	44	37	25	4	2
1925	9	28	1	1		2	1	4	5	3	8	3		
1926	7	28							6	8	8	4	1	1
1927	3	11								1		5	2	3
1928	8	127					3	5	12	66	28	8	3	2
1929		9	1	1					1	1	1	2	2	
1930	3	21			1		1		2	2	2	8	4	1
1931	3	14		1						3	4	3	3	
1932	2	13	1				1			1	5	3	2	
1933	2	17							5	3	2	4	1	2
1934	1	9			1					3	3		1	1
1935 [1]	3	54		1		1			4	11	23	9	5	
1936		7			1				1		4			1
1937	9	47							7	17	17	4	1	1
1938		3	1					1			1			
1939		20								2	5	9	3	1
1940		4				1				2			1	
1941	3	101	1	3		1		1	18	50	19	6	2	
1942		3								1	2			
1943		8							1	1	2	2	2	
1944	12	167						1	12	58	64	25	6	1
1945		21						1	2	7	5	5	1	
1946	4	34		1					2	4	7	11	8	1
1947	4	29	1	1	1		1		1	7	10	5	1	1
1948	2	24							3	4	8	7	2	
1949	5	61	1		1			1	3	11	13	17	11	3
1950	8	212						1	19	71	81	33	6	1

[1] Beginning with 1935 nonparalytic cases have been specifically excluded.

diseases whose transmission appears to be based on a person-to-person contact principle. As indicated later several other characteristics of poliomyelitis appear to be consistent with this mode of transmission.

Age Selection in Successive Decades

In table 5, attack rates by broad age groups are shown for three periods centered about a year of the decennial census. As an aid in sensing age selection, table 6 presents the age specific rates for each age period as percentages of the rate for 0–4 years.

During three decades, the tendency has been toward a greater selection of older age groups for attack. This, we feel, is entirely consistent with a thesis of person-to-person contact. Proportionately, during the past 30 years the percentage of population residing in densely populated areas has declined and family units have become smaller. There has also been a tendency toward reduction of the probability of interpersonal contact, particularly at school and preschool ages. This in turn has led to a retardation in the exposure of new susceptibles to poliomyelitis infection.

Negro Rates Lower

During the 10-year interval 1940 to 1949, the annual attack rate among Negroes has averaged 2.7 per 100,000 as compared with the white attack rate of 5.4.

Turner and associates (*2*) indicate an earlier exposure in Negroes than in white residents to Lansing poliomyelitis, and this is substantiated by recorded attack rates for 1950 (table 7). Since early exposure appears to result in a milder form of disease (table 8) there is reason to believe that the lower Negro morbidity rates for poliomyelitis are a reflection of earlier exposure, not of less exposure, which is entirely consistent with a person-to-person concept of transmission.

Seasonal Character

With very few exceptions from 1912 to 1950, poliomyelitis has originated in early summer, reached a peak in September, and terminated in November or December (table 9). The seasonal distribution of poliomyelitis is one of the attributes of the disease which is difficult to explain solely on the person-to-person mode of transmission. This characteristic is one of the principal elements in the epidemiology of poliomyelitis which awaits clarification. There exists perhaps a virulence or growth factor in the poliomyelitis agent which is seasonal in variation, but this remains to be demonstrated experimentally. Variation in host factors is another possible explanation awaiting further investigation.

Summary

1. Consideration of the distribution of cases according to white and Negro persons and geographic areas during the 1950 poliomyelitis epidemic in Baltimore City has led to a rejection of the hypothesis that the epidemic could have been caused by a common source vehicle.

2. Evidence for regarding poliomyelitis as a propagated disease of the person-to-person type has been presented.

3. Selection for attack of older groups in higher socioeconomic levels has been demonstrated to be consistent with the hypothesis of regarding poliomyelitis as a disease propagated by interpersonal contact.

ACKNOWLEDGMENT

Acknowledgment is made of the assistance of Dr. J. W. Davis and Dr. M. G. Tull of the Baltimore City Health Department.

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Trichophyton tonsurans Ringworm—A New Public Health Problem

By LUCILLE K. GEORG, Ph. D.

Ringworm infections due to *Trichophyton tonsurans* are becoming an increasingly important public health problem in the United States. Isolations of this fungus from clinical cases of ringworm of the scalp, as well as from ringworm of the glabrous skin and nails, are made more frequently than heretofore in certain sections of the country, especially in Texas and other southwestern States.

Clinical Aspects

Scalp lesions are usually superficial and chronic; the infections can persist for years. The irregular bald patches produced may be small and interspersed with normal hairs (figs. 1 and 2). The indistinct appearance of the lesions, as well as the fact that trichophyton-infected hairs fluoresce very little, or not at all, under the Wood's lamp, makes their detection extremely difficult. Many cases have been mistakenly diagnosed as dandruff or psoriasis (*1*). In a small percentage of cases, the lesions are more widespread and are characterized by the development of inflammation and even kerion (*2*).

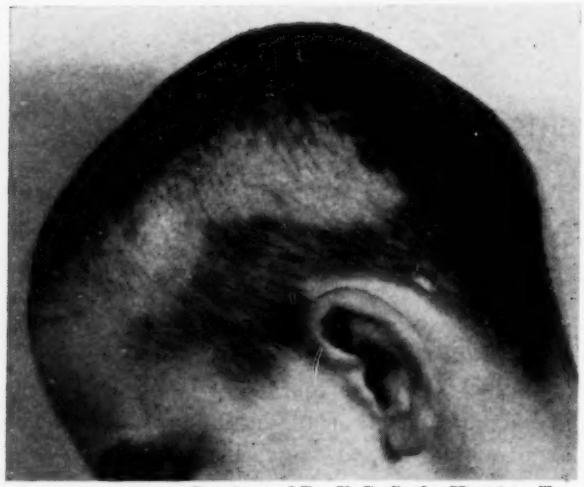
Hair infections due to *T. tonsurans* are characterized by endothrix parasitism. In scalp lesions, the organism is found almost exclusively within the hair, the spores being arranged in chains (fig. 3). The infected hairs are thickened and darkened by the mass of fungus spores within them. They tend to break off at the surface of the scalp, leaving smooth bald areas with dark hair stumps embedded in the superficial scales (fig. 2). This gives the area a speckled, "black dot" appearance which is very striking in some cases. Lesions of the glabrous skin and nails are indistinguishable from ringworm produced by other *Trichophyton* species.

Infections due to *T. tonsurans* apparently are always derived from human sources, and it is difficult to infect an experimental animal. Although the majority of scalp lesions occur in children, the infection does not, as in microsporosis, tend to disappear at puberty but may persist into adult life. Infections are usually not epidemic but they may spread to all members of a family (*1*). Scalp lesions are, in general, refractory to conservative treatment, and roentgen ray epilation is considered the treatment of choice.

Laboratory Diagnosis

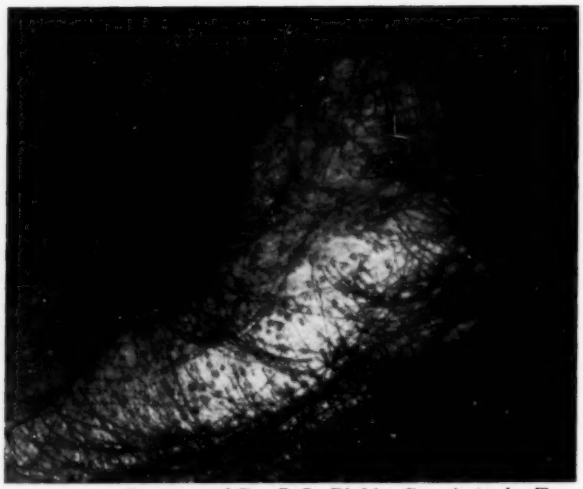
Diagnosis is based on direct examination of NaOH preparations of the hair stumps, removed with a fine forceps or the point of a scalpel, or of scrapings from lesions of the skin or nails. The position of the fungus mycelium and chains of spores packed within the hair is evidence of infection by an endothrix trichophyton. In order to observe the true position of the fungus, the outer walls of the hair should not be damaged. Therefore, care must be taken not to crush the preparation or to apply excess heat in clearing it. Only two recognized dermatophyte species found in the United States produce this picture in the hair, *T. tonsurans* and *T. violaceum*. The latter species is extremely rare and its colonial characteristics allow it to be readily differentiated from *T. tonsurans* (*3*). NaOH mounts of skin and nail

Dr. Georg is mycologist at the mycology laboratory of the Public Health Service Communicable Disease Center in Atlanta, Ga.



Courtesy of Dr. E. R. Seale, Houston, Tex.

Figure 1. Typical nonsuppurative lesion produced by *T. tonsurans*.



Courtesy of Dr. J. L. Pipkin, San Antonio, Tex.

Figure 2. Close-up of a lesion showing "black-dot" appearance.

scrapings reveal mycelia and arthrospores which are indistinguishable from those of any of the ringworm fungi.

Only by culture of the infected hairs, skin, or nail scrapings can the identity of the etiological agent be determined. *T. tonsurans* grows readily on Sabouraud's dextrose agar, producing a colony which is characteristically heaped and folded in various patterns. The surface is usually finely powdery and may show a wide range of pigmentation from white to tan, or shades of rose, violet, or yellow. One variety, which is particularly common in this country, has sulfur-yellow pigment and is known as the variety *sulfureum*.

Microscopic observation shows long, septate hyphae that are often highly irregular and varying in thickness. Some of the thick mycelium may have a knobby surface. Microconidia are numerous in the powdery surface growth of the colony, appearing as large pyriform or elongate spores that develop along the sides of the mycelium or in loose clusters. They are extremely variable in size and shape and in some instances are two-celled or appear to be budding. Macroconidia are only occasionally found and are thin-walled, slightly clavate or club-shaped, abortive structures usually of only two or three cells. Old cultures show masses of chlamydospores.

The literature lists *T. tonsurans* under many names in the "crateriform group of the endothrix trichophytons." The most common synonyms are: *T. crateriforme*, *T. sulfureum*, *T. acuminatum*, *T. epilans*, and *T. sabouraudi* According to Carrión and Silva (*4*) and González Ochoa and Romo Vázquez (*5*), it seems logical to consider these as colonial variants of the single species *T. tonsurans*, since the differences are based only on general colony form and pigmentation. Colony form, particularly the manner of the surface foldings, and pigmentation are highly variable within any of the single dermatophyte species. Figure 5 shows four common colonial variations of *T. tonsurans*.

Epidemiology

For the past 8 to 10 years, the common agent of ringworm of the scalp in the United States has been *Microsporum audouini*, and this organism has been responsible for widespread epidemics in many communities. In some sections of the country it is the cause of 80 to 90 percent of the cases of ringworm of the scalp (*6*). In Mexico and Puerto Rico, however, *M. audouini* infections are rarely seen, and a large percentage of the cases are due to the endothrix fungus, *T. tonsurans*. In a survey of cases of ringworm of the scalp in Puerto Rico, Carrión and Silva (*4*) reported that 15 of 35 cases seen over a period of 11 years, or 40 percent, were due to *T. tonsurans*. No cases of infection due to *M. audouini* were reported. González Ochoa and Romo Vázquez (*5*) have described 268 cases of ringworm of the scalp from Mexico. They

ascribed 89.4 percent to *T. tonsurans* and none to *M. audouini*.

T. tonsurans infections have been thought rare in most sections of the United States. A number of cases have been reported from several of the eastern port cities, particularly New York City, but here the percentage of tinea capitis cases caused by *T. tonsurans* was never high. Lewis and Hopper (*3*) reported only 13 from a series of 748 cases seen over a period of 6 years, or approximately 1.7 percent. Montgomery, Heinlein, and Karpluk (*7*) listed only 0.2 percent in a series of 2,857 cases of tinea capitis seen over a period of 7 years, and Benham (*8*) cited 0.8 percent in a series of 677 cases seen from June 1949 to June 1950. My personal observations of cases of *T. tonsurans* infections seen at Vanderbilt Clinic, New York City, indicated that these infections commonly occurred among Puerto Ricans who had recently immigrated to the United States. Scattered cases have been reported from Illinois (*9*), Pennsylvania (*1*), Massachusetts (*10*), Tennessee (*11*), Michigan (*12*), a case with lesions of the smooth skin only, Minnesota (*6*), Missouri (*2*), Oklahoma (*13*), and California (*14*), and recently the mycology laboratory of the Communicable Diseases Center has received cultures of *T. tonsurans* for identification from Indiana, Iowa, Massachusetts, Virginia, and Canada.

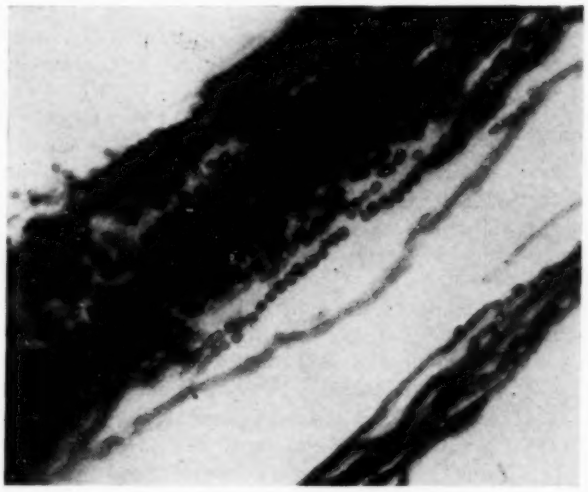


Figure 3. Hair showing endothrix invasion.

In contrast to these occasional isolations, relatively large numbers of cases have been reported from Texas, and the number of cases has been increasing in the past few years. Lehmann and Pipkin first isolated *T. tonsurans* from the San Antonio area in 1927. In 1936 and 1937, these authors, in collaboration with Emmons, conducted an extensive survey of tinea capitis in this locale. At that time, approximately 13 percent of the cases seen were proved by culture to be due to this fungus (*15*). Pipkin, in a recent communication, states that since this time he has seen constantly increasing numbers of cases of ringworm due to *T. tonsurans*. From 1947 through the first 9 months of 1951, he and his co-workers observed 592 cases of tinea capitis. Of these, 120, or 20.3 percent, were caused by *T. tonsurans*. Many of these cases of ringworm of the scalp recorded from Texas have been in adults. Of 57 cases of ringworm of the scalp in patients past puberty reported by Pipkin (*16*)—39 in adults and 18 in adolescents—42 cases were due to *T. tonsurans*. Seale (*17*), of Houston, also reports having seen a high percentage of ringworm cases caused by this fungus. Of 153 cases seen over a 2½-year period, 31, or 20.6 percent, were caused by *T. tonsurans*. He states, "There is no doubt that *T. tonsurans* infections are on the increase in this area."

Figure 4. Microscopic mount from a culture of *T. tonsurans* showing morphologic variation of microconidia and two abortive macroconidia.

Recently Livingood (*18*), of Galveston, has furnished us with statistics on the number of cases of *T. tonsurans* infections he has observed

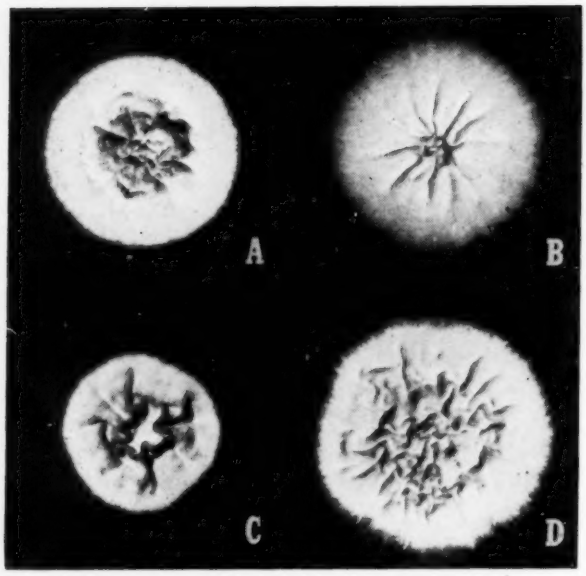


Figure 5. Colony variants of *Trichophyton tonsurans* on Sabouraud's dextrose agar. A. Variety *acuminatum*; B. variety *sulfureum*; C. variety *crateriforme*; D. variety *cerebriforme*.

in Galveston county. Of 82 patients who had tinea capitis, 56, or 68 percent, were due to this organism. Of these patients 44 were Latin-Americans. Livingood and Walton (*19*) have begun a careful survey of the schools of Galveston county, and their preliminary findings suggest that *T. tonsurans* infections are not uncommon in the school children, especially in Negroes and Latin-Americans. In a Negro school in the city of Galveston, four cases were found among 146 children. In other schools in Galveston where both Latin-American and Anglo-American children attend, the percentage infected with *T. tonsurans* was considerably less. Eight cases were seen among 790 children examined. In this school survey, the children infected were either Negroes or Latin-Americans, with one single exception.

Since Mexico is an endemic area for *T. tonsurans* infections (*5*), it seems probable that the disease has been spreading into Texas and the southwestern States from this area. It is possible that *T. tonsurans* may produce a widespread epidemic in the school children in the United States in a fashion similar to that of epidemic ringworm due to *M. audouini*. The problem would be more difficult, however, because the infections occur in both children and adults. They are more difficult to detect and usually are more refractory to treatment.

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Aquatic Invertebrates as Indicators Of Stream Pollution

By ARDEN R. GAUFIN, Ph. D., and CLARENCE M. TARZWELL, Ph. D.

Year-round field studies of the biology of stream sanitation were initiated by the biology section of the Public Health Service's Environmental Health Center on Lytle Creek in October 1949. The aims of these investigations were:

1. To develop or devise and field test procedures and equipment for biological surveys and investigations of polluted streams.

2. To investigate seasonal and diurnal environmental changes in a stream polluted with oxygen-depleting wastes.

3. To determine how the physical-chemical environment in the various pollutional zones affects the qualitative and quantitative composition of aquatic populations and how these populations in turn affect or change physical-chemical conditions.

4. To relate various qualitative and quantitative compositions of aquatic populations to environmental conditions found in streams polluted with organic wastes and to test the value and use of aquatic organisms as indicators of clean water and various degrees of pollution at all seasons of the year.

5. To determine the rate of satisfaction of biochemical oxygen demand (BOD), the area in which most of the demand is satisfied, and how seasonal and other environmental conditions affect the process.

6. To determine the value of fishes as indicators of pollution and their use in evaluating the effects of pollution.

The composition of the aquatic fauna in various sections of the stream and diurnal changes in environmental conditions are discussed here.

Lytle Creek, which was especially selected for the study, is about 45 miles northeast of Cincinnati, Ohio, and is a tributary of Todds Fork, a part of the Little Miami River system. It is a small stream approximately 11 miles long, 3 to 35 feet wide during non-floodstage, and a few inches up to 6 feet deep. The principal natural source of water in the stream is surface drainage from the surrounding area. Some 7 miles above its mouth, the creek receives the effluent from the primary sewage treatment plant of Wilmington, Ohio, a city of about 10,000 people. Lytle Creek is particularly favorable for studies of the pollutional effects of oxygen-depleting wastes because it has only one source and type of pollution (domestic wastes from Wilmington); it has no permanent tributaries below the source of pollution; and it has all degrees of pollution from a definite septic zone through recovery and back to clean water.[1]

Procedures

One of the early objectives of the Lytle Creek investigations was to evaluate the reliability and possible use of aquatic organisms (chiefly benthic forms) as indicators of the extent and severity of pollution and the degree of stream recovery. Plans were made for a comprehen-

Dr. Tarzwell is chief and Dr. Gaufin is biologist of the biology section of the Public Health Service Environmental Health Center, Cincinnati, Ohio.

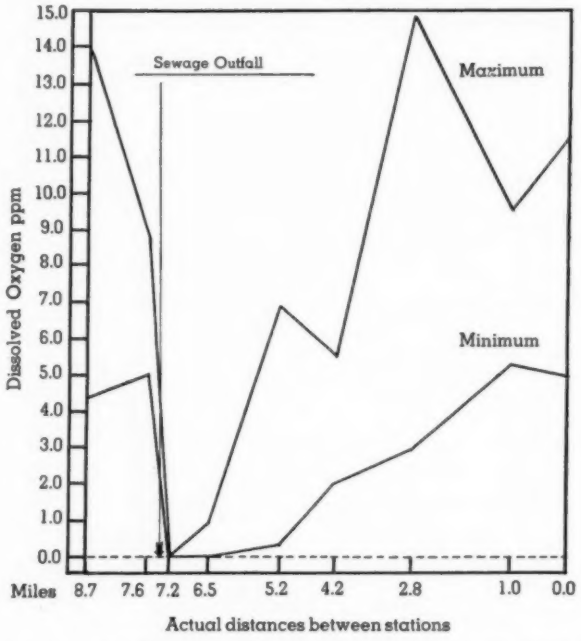
[1] Zones of pollution, as herein considered for Lytle Creek, are based principally on the amount of dissolved oxygen occurring throughout the stream. The septic zone is the area of stream showing oxygen depletion during at least some portion of the year. It grades gradually into the recovery zone where the minimum oxygen concentrations range from 0.1 to 2 ppm. In the clean-water zone minimal oxygen concentrations may be as low as 2 ppm for short periods of time.

sive study. A detailed survey was made of the stream and a map prepared showing the location and extent of pools, runs, and riffles, and the stream profile and gradient. A sharp crested rectangular contracted weir and continuous float level recorder were placed in the stream about 3 miles above its mouth for the continuous recording of flows.

During the winter and spring, flows average about 6 to 7 cubic feet per second (cfs) with frequent floods of 40 cfs or more. In late summer and fall, flows are generally small, about 0.1 cfs above the sewage plant outfall and 1 cfs below it. During periods of low summer flow, the sewage plant effluent overwhelms the stream with oxygen-depleting wastes and causes a septic zone to be produced immediately below the outfall.

Ten stations were selected along the stream course for periodic sampling in all zones. These stations were designated by their distance in miles upstream from the mouth, as stations: 0, 1, 2.8, 4.2, 5.2, 6.5, 7.2, 7.3 (sewage outfall), 7.6, and 8.7. Monthly, or more frequently, samples were taken at these stations for the determination of dissolved oxygen, pH, CO_2, methyl orange, and phenolphthalein alkalinity, and temperatures. Quantitative bottom samples were taken at monthly intervals at each station in pools, runs, and riffles. A Surber square-foot sampler was used in riffle areas, while a Petersen or Ekman dredge was used in other areas. Marginal samples were also taken, and reconnaissance surveys of bottom and surface fauna were made along the entire stream. (BOD studies have been made periodically at all stations, as well as plankton, microbottom fauna, and fish population studies.)

In the Lytle Creek investigations emphasis was placed on year-round studies to determine seasonal variations in aquatic populations and ecologic conditions. Attention was also directed to diurnal variations in physical and chemical conditions, especially during the spring and summer when they are more pronounced. Physical-chemical variations were determined by taking hourly samples at each of the stations for a 24-hour period. By these and other studies, information was obtained concerning ecologic conditions and their diurnal and seasonal variations in each of the zones. These data were then correlated with those obtained by the quantitative and qualitative studies of the benthic, marginal, and surface fauna to provide information on (*a*) aquatic populations which can be expected to develop under certain ecologic conditions, and conversely (*b*) environmental conditions or variations in environmental conditions which are indicated by various compositions and densities of aquatic organisms.



Range in dissolved oxygen, Lytle Creek, August 22–23, 1951.

Results

The chemical and physical data collected during 6 sampling runs for the 10 stations are enumerated in table 1. These data present the maximum and minimum oxygen concentrations and water temperatures occurring in the stream during the early spring and summer months. Since a wide difference in the amounts of oxygen present in the stream during day and night was noted, special attention was paid to hourly variations in the dissolved oxygen content. The range of these variations for the period 9:00 a. m. August 22 to 8:00 a. m. August 23 is presented in the chart. During the reconnaissance surveys, conducted in connec-

tion with the sampling runs, 68 genera and 79 species of animals were collected and identified. Of these species, 29 percent were Diptera, or fly larvae, a group which is adapted to live under a wide variety of environmental conditions. Fifteen species of organisms were taken in the septic zone, but only six of them, *Chironomus tentans*, *Culex pipiens*, *Eristalis* sp., *Physa integra*, *Limnodrilus* sp., and *Tubifex* sp., were abundant. Of the 23 species of mayflies, stoneflies, and caddisflies taken, only one species, *Callibaetis* sp., occurred outside of the clean-water zone. The organisms collected at five stations representative of each of the zones are listed in table 2. Their comparative abundance by month and zone is also indicated.

Among the primary requisites for animal existence are oxygen and food. When estab-

Table 1. Summary of physical and chemical conditions in Lytle Creek, 1951

Station	Range	Dates of hourly sampling over 24-hour period					
		4/24/51	5/1/51	5/9, 10/51	6/28, 29/51	8/15/51	8/22, 23/51
8.7	Maximum Temp	63°					82.5°.
	Maximum D. O	15 ppm					13.9 ppm.
	Minimum Temp	45°					59°.
	Minimum D. O	8.6 ppm					4.5 ppm.
7.6	Maximum Temp	62°					77°.
	Maximum D. O	14.7 ppm					8.8 ppm.
	Minimum Temp	47°					61°.
	Minimum D. O	7.2 ppm					5.1 ppm.
7.2	Maximum Temp	59°					71°.
	Maximum D. O	12.1 ppm					0.0 pp,.
	Minimum Temp	48°					68°.
	Minimum D. O	6.0 ppm					0.0 ppm.
6.5	Maximum Temp	60°		70°	81°	79°	79°.
	Maximum D. O	11.2 ppm		14.1 ppm	1.2 ppm	0.2 ppm	0.8 ppm.
	Minimum Temp	50°		58°	71°	64.5°	61°.
	Minimum D. O	4.7 ppm		0.6 ppm	0.0 ppm	0.0 ppm	0.0 ppm.
5.2	Maximum Temp	60.5°	76°	70°	80.5°	80°	75°.
	Maximum D. O	12.4 ppm	19.1 ppm	19.4 ppm	11.6 ppm	7.3 ppm	6.9 ppm.
	Minimum Temp	54°	65°	59°	77°	71°	61°.
	Minimum D. O	5.4 ppm	0.8 ppm	2.9 ppm	0.2 ppm	0.0 ppm	0.2 ppm.
4.2	Maximum Temp	66°	76°			77°	71.5°.
	Maximum D. O	16.4 ppm	18.1 ppm			5.4 ppm	5.5 ppm.
	Minimum Temp	54°	65°			72°	55°.
	Minimum D. O	6.5 ppm	1.0 ppm			1.4 ppm	2.0 ppm.
2.8	Maximum Temp	69°	79°		87°	87°	80°.
	Maximum D. O	13.8 ppm	14.3 ppm		10.1 ppm	12.3 ppm	14.7 ppm.
	Minimum Temp	54°	65°		72°	72°	59°.
	Minimum D. O	8.1 ppm	1.6 ppm		3.6 ppm	1.6 ppm	3.2 ppm.
1	Maximum Temp	70°		70°			73°.
	Maximum D. O	13.5 ppm		14.2 ppm			9.6 ppm.
	Minimum Temp	54°		58°			65.5°.
	Minimum D. O	6.9 ppm		5.2 ppm			5.3 ppm.
0	Maximum Temp						75°.
	Maximum D. O						11.6 ppm.
	Minimum Temp						63.5°.
	Minimum D. O						5.0 ppm.
Todds Fork	Maximum Temp						70°.
	Maximum D. O						10.7 ppm.
	Minimum Temp						62.5°.
	Minimum D. O						5.1 ppm.

Table 2. Distribution of invertebrates in Lytle Creek, May and August 1951

Organisms	Stations [1]									
	8.7		6.5		5.2		4.2		2.8	
	May	Aug.	May	Aug.	May	Aug.	May	Aug.	May	Aug.
DIPTERA										
Chironomus flavus	[2] P								P	P
Chironomus tentans					P	A	P	A	P	P
Chironomus flavicingula	P						P		P	
Chironomus quadripunctatum		P								
Chironomus sp. A		P								
Chironomus sp. B		P								
Pentaneura flavifrons	P	P								
Dictya sp		P								
Anopheles punctipennis		P				P				
Culex pipiens			P	A	P	A	P	A	P	P
Eristalis sp			A	A						
Stratiomyia sp			P	P					P	
Nemotelus sp	P									
Tabanus sp	P		P	P			P	P	P	P
Palpomyia sp					P	P				
Stilobezzia sp									P	P
Brachydeutera argentata					P	P	P		P	
Simulium vittatum	P								P	P
Hemerodromia sp	P									
Pilaria sp	P									
Tipula sp	P								P	
Eriocera sp	P								P	
Paradixa sp	P									
COLEOPTERA										
Stenelmis crenata	P	P								
Stenelmis sp		P								
Simsonia quadrinotata	P									
Bidessus sp. A		P								
Laccophilus sp	P							P	P	P
Berosus sp										P
Tropisternus lateralis						P		P		
Tropisternus sp	P	P	P	P	P		P	P	P	P
Laccobius sp				P		P		P		
Peltodytes sp	P	P						P	P	P
Gyrinus sp										P
Dineutes sp										P
EPHEMEROPTERA										
Baetis cingulatus		P								
Baetis parvus	P								P	P
Caenis sp	P	P							P	P
Callibaetis sp		P						P		
Isonychia albomanicata										P
Stenonema femoratum	P	P							P	P
Stenonema ohioense	P	P							P	P

See footnotes at end of table.

lishing biological indices of pollution, such requisites must be taken into consideration. In Lytle Creek from November 15, 1950, to April 1, 1951, the volume of flow was more than 6 cfs on all except three occasions. The time of flow from the sewage outfall to the mouth at Todds Fork never exceeded 48 hours. Water temperatures were under 60° F., and oxygen concentrations approached saturation throughout the stream. From the standpoint of dissolved oxygen, the stream was satisfactory for most types of bottom organisms throughout its length during the entire period. Chemically, the water appeared to be relatively free from harmful pollution, but the fauna that was present still reflected the critically low oxygen concentrations occurring in the past.

From April 1 to October 1, the volume of flow

Table 2. Distribution of invertebrates in Lytle Creek, May and August 1951—Continued

Organisms	Stations [1]									
	8.7		6.5		5.2		4.2		2.8	
	May	Aug.	May	Aug.	May	Aug.	May	Aug.	May	Aug.
TRICHOPTERA										
Brachycentrus americanus										P
Cheumatopsyche sp	P	P							P	P
Hydropsyche betteni	P	P							P	P
Hydropsyche bifida									P	P
Chimarra obscura	P								P	P
Dolophilus shawnee	P									
Phyacophila lobifera	P									
Ochrotrichia sp	P									
Hydroptila consimilis	P								P	
Hydroptila sp	P								P	
PLECOPTERA										
Acroneuria evoluta		P								
Allocapnia viviparia	P									
Nemoura venosa	P									
Perlesta placida	P									
Neoperla clymene									P	
Isoperla minuta	P									
ODONATA										
Plathemis sp								P	P	P
Paltothemis sp								P		
Argia sp	P								P	P
Agrion sp	P								P	P
Enallagma sp								P		P
NEUROPTERA										
Corydalis cornutus										P
Sialis sp		P								P
HEMIPTERA										
Belostoma sp		P			P		P	P	P	P
Corixidae	P	P	P	P					P	P
Gerris sp	P	P							P	P
Microvelia sp		P								P
Notonecta sp								P		P
Ranatra sp								P		
CRUSTACEA										
Asellus sp	P	P							P	
Cambarus rusticus	P	P							P	P
Hyalella sp		P								
MOLLUSCA										
Physa integra	P	P	P	P	P	A	P	A	P	P
Sphaerium solidulum	P	P								
ANNELIDA										
Limnodrilus sp			P	A	P	A	P	A	P	P
Tubifex sp			P	A	P	A	P	A	P	P
Glossiphonia sp								P	P	
Total species per station	40	29	9	10	9	10	10	19	37	37

[1] The stations are classified into zones of pollution as follows: clean water, 8.7 and 2.8; septic zone, 6.5 and 5.2; zone of recovery, 4.2.
[2] A=abundant; P=present.

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dropped to an average of 1 cfs, the time of flow extended to 7 or 8 days, water temperatures rose to as high as 87° F., and oxygen concentrations became critically low in the 4-mile section of stream below the sewage treatment plant outfall. Definite pollutional zones were established in May and persisted throughout the summer. An abundant food supply and a variable oxygen supply below the treatment plant outfall resulted in a distinctive fauna in each of these zones.

Critically low oxygen concentrations were found in the stream during the night at station 6.5 as early as May 9. Concomitant with the low nocturnal values, remarkably high oxygen concentrations were recorded during the afternoon at the same station. Peak concentrations of oxygen for the season occurred before the deciduous stream-side trees began to exercise a shading influence. A dissolved oxygen value of 19.4 ppm was found at station 5.2 at 3 p. m. on May 9. This peak was produced by a heavy plankton bloom. When marginal vegetation shaded the stream, blooms became less marked and daytime oxygen values were not as high.

As the summer advanced, oxygen depletion became of progressively greater duration and extent. The result was a well-defined oxygenless zone extending from the sewage treatment plant outfall to a point 2 miles downstream, as indicated by studies carried out on the night of August 22. This depletion persisted throughout the day at stations 7.2 and 6.5. The range in hourly dissolved oxygen values found late in August at the various sampling stations along the stream is shown in the chart.

Discussion

One of the primary objectives of the Lytle Creek studies has been to arrive at a better definition of indicator organisms. The finding of certain organisms, such as rat-tail maggots, *Eristalis* sp.; sludgeworms, *Tubifex tubifex;* and bloodworms, *Chironamus tentans*, presents important evidence of the pollutional condition of a stream (*1*), while the absence of cleaner water forms is likewise a valuable measure of existing conditions.

With favorable ecologic conditions, such as high temperatures, uniform flow, freedom from floods, and abundant food, prevailing throughout the summer of 1951, a surprisingly large and varied macrobottom fauna developed in the stream. This condition was observed during May and again in August when special collections of aquatic organisms were made at all sampling points along the stream, and their distribution correlated with the diurnal physical and chemical conditions prevailing at the various stations.

In evaluating aquatic organisms as indicators of pollutional conditions, great caution must be used because of several complicating ecologic conditions. First, many organisms which occur in large numbers in extremely polluted water may also be found in limited numbers in cleaner situations. Several species of invertebrates, such as the mosquito, *Culex pipiens;* beetle, *Tropisternus* sp.; and sludgeworms, *Limnodrilus* and *Tubifex* spp., which occurred in abundance at stations 6.5 and 5.2, also occurred in the clean-water zones. Second, many species listed in table 2 occurred in such small numbers as to discourage their individual use as indicators. Third, several ecologic factors other than the presence of a pollutant may limit the distribution of certain species; for example, erosion, floods, the size of the stream, the type of bottom, the flight range of the insect, and the portion of the stream under study. It is believed that the moderate abundance of single species should not be considered as biological indicators of pollution because organisms such as *Tubifex* usually associated with polluted areas are also found in clean waters. It is the complex or association of organisms which is important for indicating clean or polluted water. All organisms present and their relative abundance must be considered.

In satisfactorily using associations of aquatic organisms as indicators of pollution, the absence or much reduced numbers of formerly present clean-water species in an area may be as important, or more so, as numbers of known pollutional forms (*2*). In this connection, table 2 shows that such insects as mayflies, caddisflies, stoneflies, and hellgramites were almost entirely limited to the clean water occurring at stations 8.7 and 2.8. The only exception was a mayfly, *Callibaetis* sp. This form was collected in a marginal surface sample and evidently had

been able to obtain sufficient oxygen from the surface film to survive.

The absence of organisms, which are indicative of clean-water conditions, from a section of stream should not always be taken as definite indication of pollution. A knowledge of the life histories of the various groups of aquatic insects often is helpful in interpreting the meaning of their distribution. For example, in the collection of invertebrates made in August, only one species of stonefly and five species of caddisflies were represented. In the May collection five species of stoneflies and nine species of caddisflies were present. Their absence later on was due to their emergence as adults during the intervening months. Similarly, the absence of some beetles, dragonflies, and damselflies in the earlier collections was partly due to their presence in immature stages so that they were missed or overlooked.

Apart from the fact that pollutional organisms must be found and clean-water species must be missing in delineating the zones of pollution in a stream, the mode of occurrence of the organisms must be taken into account (*3*). For example, the assemblage of organisms found in the polluted zones of Lytle Creek presented the following characteristics: (*a*) very large numbers of individuals; (*b*) few species represented in the fauna; (*c*) principally scavenger types present; and (*d*) the presence of forms having low oxygen requirements or special adaptations for obtaining their oxygen supply. Not over 10 different species of macroinvertebrates were taken from stations 6.5 and 5.2 in the septic zone at any one time, while as many as 40 species were found in the clean-water zones (table 2). However, as many as 3,000 *Culex pipiens* or 20,000 Tubificids were collected per square foot sample in the septic zone, while no species exceeded 500 individuals per square foot in the clean-water area. All the insects occurring in the septic zone have special adaptations for obtaining oxygen, such as the caudal respiratory tubes of the mosquito and rattail maggot or the air space under the elytra of the beetles. With such adaptations, depletion of oxygen in the water does not serve as a barrier to their distribution. An abundant food supply enables these forms to attain a great abundance in polluted areas.

When conditions are favorable for organisms which can adapt to pollution, they thrive and build high populations (*4*). For this reason, the society of organisms found in zones of pollution is highly significant in offering clues to the intensity of pollution and the degree of recovery. If changing conditions brought about by pollution are unfavorable, organisms must resist these changes, migrate, or be destroyed. Since many of the species of insects found in Lytle Creek are found in both the lower and upper sections of the stream but are missing in the pollutional zones, and since such organisms are continuous in other nonpolluted streams in the area, it seems probable that pollution is responsible for their discontinuous distribution in Lytle Creek.

In a stream polluted with organic wastes, a certain reduction of the supply of dissolved oxygen may occur in a certain section throughout the year, during the summer months, or for only a few days in the year. Because pollution surveys frequently cannot be made during the period of critical conditions, and chemical studies give information on physical-chemical conditions only at the time of sampling, there is need for additional methods which can be used throughout the year for determining over-all conditions and the extent and severity of brief critical or limiting environmental factors. The qualitative and quantitative composition of an aquatic population is determined by recurring critical conditions, even though of short duration, as well as the more stable or long-time environmental factors. Therefore, the complex of organisms which develops in a given area is in turn indicative of environmental conditions which have occurred during its development. Organisms having life histories of a year or more will thus serve to indicate unfavorable or limiting conditions that have occurred several months previously. Because aquatic populations are a result of past environmental conditions, they serve as a means for determining such conditions in a stream. They are especially valuable because they can be used during fall, winter, or spring months, when flows are large, dilution is at a maximum, dissolved oxy-

gen is near saturation, and visual evidence of pollution at a minimum, to delineate former septic areas or to indicate critical conditions of short duration.

In order to utilize aquatic populations in this way, however, it is essential to have a knowledge of the species composition and abundance of the various organisms in the population under the various ecologic conditions which prevail in clean and in polluted waters. Further, consideration must be given to the fact that pollution with organic wastes is only one of the several environmental factors determining the composition of aquatic populations. Other environmental factors, such as type, size and character of the stream, variations in flow, severity of silting, floods and erosion, water temperatures and the character of the watershed, are all important in determining the make-up of aquatic populations. Occasionally, there is a sparsity of bottom organisms which makes the drawing of any conclusions in regard to organic pollution difficult. However, one who has knowledge of and experience with aquatic organisms can, by a reconnaissance survey, learn a great deal about the severity and extent of pollution and the extent of stream recovery even though the survey is made at a time of year when the physical-chemical indicators of pollution are least evident or largely absent.

Conclusions

1. Single species of organisms such as *Tubifex tubifex*, or *Chironomus tentans* cannot be used safely as indicators of pollution unless their relative abundance is considered.

2. The absence or much reduced numbers of formerly present clean-water species constitutes an important index in evaluating the degree of pollution.

3. The quantitative and qualitative composition of an aquatic population constitutes a valuable index in delineating zones of pollution in a stream.

4. In interpreting the distribution of organisms in a stream as an index of pollutional conditions, all environmental factors should be considered.

5. Pollutional associations are characterized by few species but large numbers of individuals.

6. The association of organisms normally present under most septic conditions is characterized by the absence of plant and animal eaters and the presence of scavengers.

7. Organisms characteristic of septic zones are those which can exist under conditions of very low oxygen or have adaptations for breathing atmospheric oxygen.

8. Nocturnal deficiencies in dissolved oxygen are often the critical environmental factor which determines the distribution of organisms in a stream.

9. Under conditions of organic pollution diurnal-nocturnal deficiencies in oxygen are sometimes concomitant with supersaturation of dissolved oxygen.

ACKNOWLEDGMENTS

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Enforcement of the housing code by the Baltimore City Health Department made this neighborhood a better place to live.

Health Departments *and the* Housing Problem

By RALPH J. JOHNSON, M. S.

Despite advancing standards of living, 16,000,000 American families live in housing that has basic health deficiencies. This is the hard core of the housing problem for health officials; it is a problem that they can help to reduce.

The housing problem is pervasive; every individual, group, and organization has a stake in attacking it. Unless positive action is taken, this problem can only increase. The housing situation is not static. Heavy outlays of housing goods and services are necessary merely to provide for the population increase, for normal maintenance, and to offset obsolescence. Far heavier outlays are necessary to improve the relative supply of decent housing. These are the relentless dynamics of housing progress.

The attack on housing conditions through new construction, redevelopment, and public housing has been described extensively. But the opportunities for improving substandard housing by enforcement of health regulations has been given far too little attention.

The health department has a unique and personal relationship with the families who occupy substandard housing. The public health nurse and sanitarian are frequent visitors to the slum home and the blighted area. Morbidity and

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mortality rates, along with nuisance complaints, are almost always higher in these areas than the average for the community. It follows that public health problems are greater and expenditures for services higher in these areas.

The housing problem is not hopeless—even the root-evil of poverty is not entirely insurmountable. An attitude of despair and neglect is the precise prescription for decay and rot which is the forerunner of the creeping blight that turns decent housing and its environment into slums. It is undeniable that there is a reciprocal effect between physical conditions of blight and family morale. Tenant and owner neglect of dwellings and community neglect of environment and services interact upon and contribute to each other. Somewhere in every slum is to be found a combination of these factors.

This regressive trend can be reversed. Many changes and improvements can be made within existing knowledge and ability. The problem becomes in part, then, a matter of attitude. Health officials are in a strategic position to stimulate a new attitude of confidence in our capacity as a Nation for positive improvement of much of our present substandard housing.

It has been demonstrated in several cities that when health departments enforce minimum standards of healthful housing, community interest is awakened and incentive for further improvements is provided. In true American fashion, neighbors begin to help each other and themselves; they paint the porches, repair the walls, clean the yards, mend or remove fences, and plant flowers. Departments of city government repair streets, provide better garbage collection, remove dead tree limbs, and improve services. An act of magic has not been performed, but self-respect has been restored in a deteriorated environment. The trend has been reversed; positive forces—which, like negative forces, interact and augment each other—have been put to work. When these forces become dominant, fundamental mastery of the problem has begun.

However, no single neighborhood, nor single office of government, branch of industry, or organization of citizens can alone master the total problem. A single agency or organization can no more expect to solve the whole housing problem than can a single agency or organization expect to deal effectively with any other major problem of society.

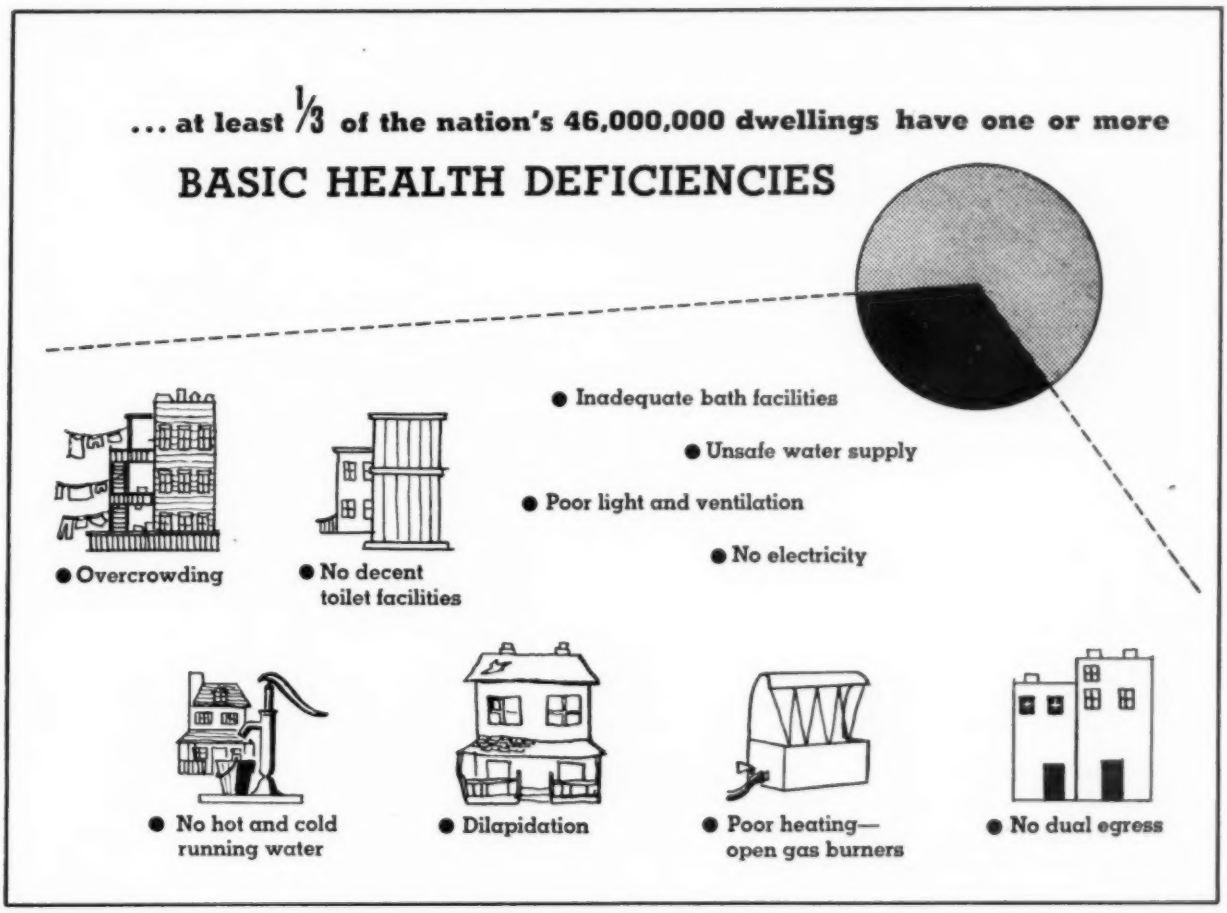
The Housing Problem

Housing problems are as complex as the world we live in—the resultant of a multitude of interrelated and interdependent forces. They are functions of such fundamental factors as natural resources, land, population, income, labor, industry, government, war, and peace. For at least a century in this country, we have had the housing problems of high land density, intermixture of land use, inadequate planning, overcrowding, and poverty (*1*, *2*). Housing, in other words, cuts across social, political, and economic boundaries.

The entire housing problem also is related to transportation, community expansion, interest rates—in short, a whole complex of factors other than the dwelling and its immediate environment. We are concerned here mainly with substandard housing and its relation to public health. We may measure an important dimension of this problem by studying the numbers and types of substandard housing as revealed by the 1950 census (*3*).

Notwithstanding the greatest building boom in our history, approximately one-third of the Nation's 46,000,000 dwellings have basic health deficiencies. Approximately 6,600,000 dwelling units—1 out of every 7 in the country—are overcrowded. About 1 out of 11 dwellings is so dilapidated that it provides inadequate shelter or protection against the elements or actually endangers the safety of the occupants. Approximately 13,800,000 dwellings—almost 1 out of 3—lack hot and cold running water inside the structure. More than 6,900,000 have no piped running water. Only half of these are in rural farm areas.

Approximately 12,900,000 dwellings lack decent toilet facilities. Surprising as it may seem, only about one-third of these deficiencies are in rural farm areas. Almost 1 out of 3 dwellings do not have bath facilities or the occupants must share these facilities with some other family. More than 1 out of 4 dwellings do not have a bathtub or shower and more than 60 percent


... at least 1/3 of the nation's 46,000,000 dwellings have one or more
BASIC HEALTH DEFICIENCIES
● Inadequate bath facilities
● Unsafe water supply
● Poor light and ventilation
● No electricity
● Overcrowding
● No decent toilet facilities
● No hot and cold running water
● Dilapidation
● Poor heating—open gas burners
● No dual egress

of these are found in urban and rural nonfarm areas.

The division between substandard and acceptable housing is shadowy and covers a range of units. However, using "condition and plumbing facilities" as an indicator, it can be estimated from the 1950 census of housing that approximately 16,000,000 dwelling units have one or more basic health deficiencies. Detailed surveys by local health departments in representative communities across the Nation underline these national figures.

If we consider the needs revealed by these figures along with the modern concept of health as a condition, not only where disease is absent, but where there exists the desire and ability for productive effort in concert with family and community, then the health department's opportunities and responsibilities emerge in their true perspective.

As new housing production declines (*4*), the health department's role in relieving the housing problem becomes the more urgent. The supply of good housing can be increased by rehabilitating existing substandard housing which has a sound frame and foundation.

Methods of Attacking the Housing Problem

With some simplification, the attack on the housing problem in terms of dwelling units may be divided into three general forms of action:

Prevention of accelerated rates of deterioration of dwellings and their environment, thereby forestalling the formation of new blighted and slum areas;

Rehabilitation of existing substandard housing, if salvage is economically feasible, and the demolition—which is part of rehabilitation in its broader sense—of substandard dwellings that are beyond repair;

Production of enough new housing to provide for the population increase, for families

now overcrowded, for replacement of demolished and decayed structures, and for the normal vacancy cushion.

In short, prevention, rehabilitation, and production are all necessary to improve housing conditions. In these areas, special responsibilities have been assumed by private enterprise and Federal, State, and local governments. In prevention and rehabilitation especially there is an underlying essential—an informed citizenry.

Private Enterprise

The role of private enterprise in attacking the housing problem has been well defined over the years. Industry produces the materials used in the construction of all housing, including improvements and ancillary utilities and facilities. The private builder and contractor erect almost all new housing, including that small segment which is built for public ownership. Private enterprise sells most new and existing housing. Private capital, with some assistance from government, provides the financing essential for almost all new construction and for most substantial improvements to existing housing. That private capital and industry can and do handle such a large part of the task is characteristic of this Nation.

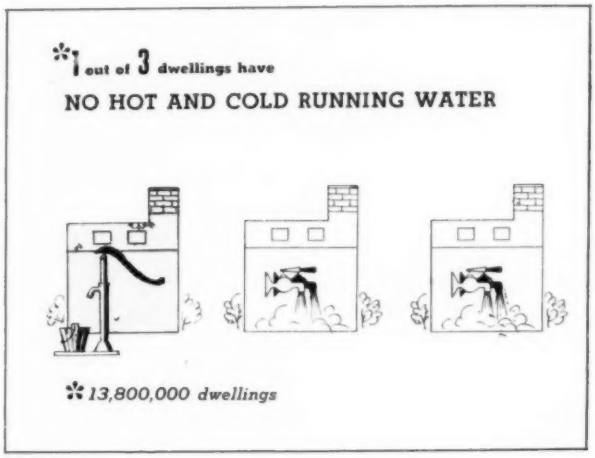
Federal and State Government

Federal and State governments provide assistance and services that individuals and organizations cannot provide for themselves. Federal legislation provides assistance with the insurance of mortgages, with the insurance of deposits in home loan banks, with mortgage money market financing, slum clearance and urban redevelopment, low-rent public housing, research, loans and grants for farm housing, rent control, and with the collection of national statistics on housing, labor, and building materials. Furthermore, the Congress of the United States has established a national housing policy stating that "the health . . . of the people, requires . . . as soon as feasible a decent home and a suitable living environment for every American family . . ." (*5*).

State governments provide assistance primarily with public housing, slum clearance and urban redevelopment, regional planning, and basic legislation and police powers authorizing certain regulations.

Local Government

It is of prime importance that the programs of all agencies of local government having anything to contribute toward better housing—and it is a surprising number—be coordinated and be undertaken in a spirit of cooperative action. Cooperation of the local health department is especially important because the basic police power of the State to regulate must be reasonably related to welfare, morals, safety, or *health* if the regulation is to be held valid. Consideration of the housing problems of the other



agencies of local government will materially assist the health official to carry out the health department program with the maximum effectiveness; the opposite, of course, is equally true.

Building Department

The primary function of the building department is to administer the building code which regulates the construction of new dwellings and major structural changes or additions to existing dwellings.[1] The building department issues licenses in the form of building permits

[1] A full and detailed discussion of building regulations has been presented by McGoldrick and associates (*6*).

authorizing new construction. It also enforces compliance with the electrical code, with structural requirements, and usually with the plumbing code for new dwellings. The provisions of the building code regulate such items as light, heat, ventilation, and plumbing facilities for new structures. These are obviously related to health department interest. Significantly, moreover, the building code fixes the dwelling problem which the health department will inherit in a decade or two, or three, as deterioration takes place and health problems arise.

Planning Department

The planning department is concerned with the physical facilities of the community and the location of these facilities for the benefit of the people. Housing in its broadest sense is an important part of these physical facilities. The quality of the dwelling and its environment as a healthier place to live is affected by the size and location of streets, by the location of parks, playgrounds and schools, by the location of water and sewer lines and other utilities, and by the type and location of community facilities. The control that planning and zoning officials can exert over the development of new subdivisions, coupled with health department participation, can curtail, if not eliminate, urban fringe sanitary problems.

The Zoning Board

The zoning board is usually administratively related to the planning department. It administers the zoning code which fundamentally regulates the height of buildings, the density of land coverage, and the use of land in the interest of the general welfare and health of the community and for the protection of land values. The zoning board has the authority to prevent intermixture of land use, to prevent subdivision of large dwellings into multiple units where kitchen and bath facilities are frequently shared, to regulate lot size and percent of land coverage, and to regulate the height and separation of buildings and dwellings. Obviously, the health official has direct interests in these activities.

The Fire Department

In the context of this discussion the inspection service of the fire department is concerned with the design, construction, and maintenance of multifamily dwellings, rooming houses, hotels, and public buildings in the interest of protecting the occupants and the community against injury or death by conflagration or explosion. The dimly lighted public hall, the deteriorated stairway, the anxiety of occupants with a single means of egress, and the accumulation of rubbish or trash are as much the concern of the health official as of the fire official. Thus, health and fire departments have a number of related interests with respect to the housing problem.

Welfare Department

The welfare department provides financial assistance for families with insufficient means. At least one-fifth to one-third of these family funds are used for rental payments for housing. Although welfare departments consistently try to help families obtain the best housing possible, it is well known that welfare funds, for the most part, are only sufficient to obtain substandard housing. This situation requires administrative cooperation between health and welfare officials in the local government and subsequent citizen support.

The rental payments of welfare departments are a tremendous resource that may be used in attacking the poverty aspects of the housing problem. According to the *U. S. Municipal News* (*7*), 4 percent of the population of 25 leading cities in 1948 were on relief and received an average monthly payment of $34 a person. If we apply these average figures to the population in urban areas and consider that one-fourth to one-third of these funds are used for rental payments, it may be conservatively estimated that some $25,000,000 to $30,000,000 per month of welfare funds are being spent for rental payments. Since much of this sum pays the rent for substandard housing, this in effect subsidizes such housing.

Although the rents for substandard housing are low in terms of dollars, they frequently are high in terms of the space and facilities provided. These comparatively high rates of rent on slum properties are too well known to merit elaboration. However, experience in several communities has demonstrated that improvements can be made in many dwellings without

substantially increasing the rent and still allow a reasonable return on the investment to the owner. Of course, this is not the case for all improvements.

Although welfare departments make an effort to establish certain standards for housing to be occupied by relief clients, minimum health standards of housing, in the last analysis, must be based on the health aspects of the police power of the States. The primary responsibility for the development, application, and enforcement of the health aspects of the police power is generally vested in health officers. If then the health official establishes minimum housing standards, and the welfare department adopts the policy of making rental payments only for those dwellings which meet these minimum standards, it will be possible to bring to bear the leverage of these tremendous payments to obtain improved housing conditions.

Housing Authority

The local housing authority is established as a corporate body of the community through State enabling legislation. This legislation primarily authorizes the housing authority to issue municipal-type bonds to provide the capital for building public housing units and to accept Federal payments to equalize the deficit between costs and income.

These dwellings are constructed for low-income families who cannot obtain or provide decent, safe, and sanitary housing for themselves at an economic rent in the community. A number of health problems arise in the location, construction, and management of public housing projects. Many important public health problems related to public housing developments, such as site selection, re-use of cleared land, and occupancy and management, can be averted by sanitary engineering advice (*8*). Since the housing authority and health officials are concerned to a considerable degree with similar areas in the community, they have a number of mutual problems (*9*).

Slum Clearance and Urban Redevelopment Agency

The slum clearance and urban redevelopment program was initiated as a result of the Housing Act of 1949, which authorized funds for loans and grants to local agencies primarily for the purpose of assembling and clearing slum land for re-use. Ordinarily the cleared land will be re-used for housing purposes. However, its use must be in conformance with the requirements established by the master plan of the community. Many health problems arise in determining the best re-use of land in slum areas. Furthermore, the law requires that persons displaced from the cleared areas must be rehoused in decent, safe, and sanitary dwellings under reasonably equivalent conditions. The health official can make a real contribution to the determination of such dwellings and choice of areas for redevelopment (*10*).

Health Department

The principal housing responsibility of the health department is the administration of the housing code regulating the facilities, maintenance, and occupancy of existing dwellings. Although the minimum standards contained in the code are applicable to all dwellings, obviously they are primarily applicable to substandard housing.

The first step in this task is to diagnose the problem. To do this the health department must obtain the facts. The Committee on the Hygiene of Housing of the American Public Health Association has devised an objective method for measuring the quality of housing and its environment in a community (*11*). Many local health departments across the Nation have already used this method to study the housing problem.

Through an agreement between the American Public Health Association and the Public Health Service, training in the use of this method is available at the Public Health Service housing training stations at Atlanta, Ga., and Syracuse, N. Y. Follow-up assistance is also provided. No charge is made for the course, but the trainee must provide for his own subsistence and quarters. Approximately a quarter of a million dwelling unit schedules and related environmental data have been completed by using this method.

Communities report that the information obtained through this appraisal method is useful to so many agencies of local government that it is an important administrative device for obtaining interagency cooperation. However, ir-

respective of the appraisal method chosen to measure the housing facts in a community, it is imperative, from an administrative standpoint alone, to use a method that provides the essential information for all of the agencies concerned. The method must be objective, reducible to a numerical basis, and produce results subject to disciplined analysis. Of course, it should be possible to reproduce and to validate the results.

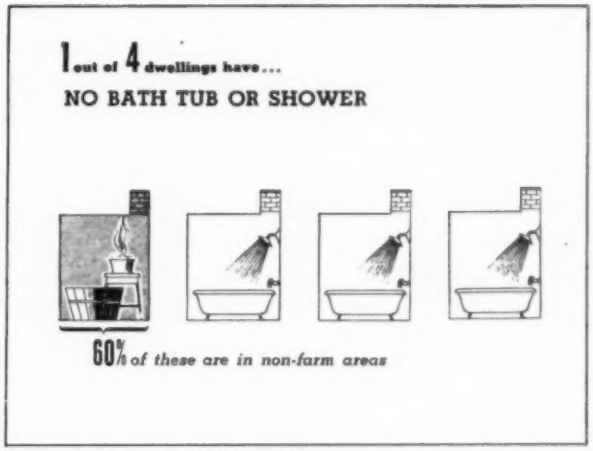
Whether this or some other survey method is used, the health department must obtain detailed facts concerning the housing problem in the community. As is customary with health problems, the facts of the situation must be presented to the public so that the community may have the necessary information to use as the basis for the choice of remedial action.

This leads to the second step, which is to tell the story of housing to the public. It has been clearly demonstrated in several communities that informing the public regarding existing housing conditions is an essential part of a housing law enforcement program (*12*). It is not enough to make broad general statements and propose general programs; specific information must be obtained so that detailed facts may be stated and action policies formulated.

Once the specific information has been obtained and presented to the community, the third step, the formulation of minimum health standards for housing and adoption of laws for their enforcement, may be intelligently accomplished. The persons to be affected by these standards and laws—the housing code—should be given an opportunity to be heard, to present contrary evidence or opinion, and significantly to help define for the administrator the level of community acceptance of the proposed regulations.

However, laws are not self-enforcing. Once they are established, the actual accomplishments of enforcement—the fourth step—stands or falls on the judgment, the efficiency, and the impartiality with which the laws are administered. Since some of the principles of housing law enforcement have been discussed before (*13*) suffice it to say that effective action cannot be expected without adherence to good administrative-legal practices.

The housing law enforcement program is not



the only responsibility of the health department in the solution of the housing problem. The health official has an important job to do in assisting all the other departments of local government to accomplish their housing tasks. Examples of areas of common interest with other local governmental agencies were previously discussed and need for cooperative action was emphasized. As health officials become familiar with the housing programs of other agencies in the community, they will be able to contribute substantially to the improvement of housing in terms of both immediate action and long-range programs.

Clearly, the maximum community benefit from housing law enforcement activities of the health department cannot be obtained if the program is conducted in isolation. It is necessary for the health department, in conjunction with all other official agencies of government and with representative community organizations concerned with the housing problem, to decide on the extent and area of enforcement. It is particularly important, of course, that the housing law enforcement program be coordinated with the programs of the slum clearance and urban redevelopment agency and the housing authority, rental payments of the welfare department, and the master plan of the community.

Urban Nonfarm and Rural Housing

Housing is by no means entirely an urban problem. Numerous studies have been made of substandard housing in the small cities and rural areas as well as in the metropolitan communities (*14*, *15*). Unfortunately, most of the

local agencies referred to do not exist in small communities or rural areas. If they do, they seldom are staffed to carry out the housing functions referred to previously. This increases the importance of housing action by local health departments, where they exist, or by State health departments having jurisdiction in small communities and rural areas.

Although only a very few rural public housing authorities are in existence, there is a trend toward development of public housing programs in small communities. The need for participation of health officials in the health problems of these developments is comparatively greater than in the large cities.

The Housing Act of 1949 recognized the need for assistance in rural housing problems and provided loans and grants for housing improvements to owners of farm dwellings unable to obtain financial assistance elsewhere. This program is administered by the Farmers Home Administration through its state directors and the county agents of the Department of Agriculture. The Farmers Home Administration has adopted rules and recommendations establishing minimum standards for construction and repair of dwellings (*16*). These standards cover items relating to light, ventilation, room size, site location, water supply, plumbing, sewage disposal, heat, and other items of special interest to health officials, and require compliance with local regulations.

Certainly substantial improvements to farm dwellings, including the water supply and sewage disposal facilities, can be made through cooperative effort between local representatives of the F.H.A. and health officials.

Discussion

The Nation's housing problem has developed over a period of a century or more. The prevention of decay of dwellings and their environment, the rehabilitation of existing substandard housing, the demolition and replacement of dwellings beyond repair, and the production of enough new housing present enormous difficulties. Dollar estimates of the cost of such a program are staggering. A successful beginning has been made, and there can be extensive progress with present-day knowledge. We should expect substantial results in one generation.

No single agency of government or industry working alone can solve the total housing problem; the solution depends on the combined efforts of Federal, State, and local government, and private enterprise with the active support of informed citizens all working as a team. The health department is an important member of this team.

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Evaluating Health Education

By ANDIE L. KNUTSON, Ph. D.

Health people frequently ask: How can we tell if we are accomplishing anything? What methods should be used to evaluate our work? What are the criteria for effectiveness in health education?

This paper is a general approach to, or a philosophy of, evaluation. It outlines some basic concepts to consider when planning and conducting health education evaluation. The concepts, although presented independently, are closely interrelated and supplement each other.

Three things of utmost importance in evaluating health education are (*a*) the correct selection or development of methods, (*b*) the proper use of the methods selected, and (*c*) the sound interpretation of the data obtained. Given below are a few basic guidelines which should be considered in selecting, applying, and interpreting the techniques of measurement used in evaluating health education.

Exploratory Fact-Finding

Planning evaluation studies of health education requires adequate exploratory fact-finding. Such explorations should be considered as part of planning a health education program. They should assure that the program is directed toward satisfying expressed needs or interests of the people for whom it is designed and that the methods used tie in with existing behavior patterns. Careful exploration is particularly necessary when the program aims to change behavior. If such problems are not considered as part of planning a health education program, it may be based on false or inaccurate assumptions regarding behavior and have little possibility of success. Later efforts at evaluation would have limited or no value.

For example, before attempting to measure the effectiveness of a program to inform people about the nutritional value of proteins, carbohydrates, vitamins, minerals, and fats, one must know what meanings these terms convey. How can the concepts described by these terms be most easily incorporated into the usual pattern of living? Do people shop for proteins and carbohydrates or do they buy meat, vegetables, and baked goods? How can they improve their food habits with a minimum of change in their current patterns of buying food and planning meals?

A program designed to increase the use of milk may miss its goal if the people for whom it is planned do not consider milk an essential food. Or an information program on the early symptoms of cancer may not lead to action unless these symptoms are described in terms people understand and can recognize.

Specific Goals

The broad purposes of an educational program must be broken down into specific, concrete, definable goals before evaluation can be undertaken. When the objectives are fully and concretely defined, one can determine in advance what kind of data will yield the best evidence of their achievement. A study design can then be developed to collect the necessary data.

On the other hand, if an over-all evaluation is attempted without breaking the broad purposes of the program into specific goals, the results are likely to be inadequate, yielding personal impressions rather than objective meas-

Dr. Knutson, a social psychologist, formerly was associate director of the Office of Public Opinion Research of Princeton University. He is now chief of the experimental and evaluation services branch of the Division of Public Health Education, Public Health Service.

urements. (See references *1*, *2*, and *3* for experimental evidence of the errors which result when general ratings are used in attempting over-all evaluation.) Such impressions will vary according to the experiences and interests of the persons doing the evaluating. As shown by studies in social psychology (*4*), each evaluator will tend to see in the program the things which are meaningful in terms of his own experiences. He will judge it against his own unique and undefined scale of values. One evaluator may view a part of the program in which he is interested and judge it to be good; another may rate this same part as poor; while a third may not even consider it to be significant and will base his judgment on some other aspect of the program. In the end, the evaluation is essentially a variety of unrelated personal opinions.

General vs. Specific Evaluation

The interrelationship between the findings on the achievement of specific goals must also be considered. The whole is greater than and sometimes different from its parts. While a general evaluation may be referred to as such, in practice it means that an empirical judgment has been made, based on various specific evaluations.

In making a general health examination, the doctor measures specific things, such as height, weight, blood pressure, pulse, and vision. His general evaluation is limited by the degree to which he can break it down into measurable specifics and by his understanding of the interrelationship of these specifics. At the same time, the examination is limited by his own experience, through which he has learned to see certain things to the exclusion of others, and by his own concept of general health as it relates to a patient. Accuracy in interpretation is limited to a person's ability to perceive and to understand. Thus, a general practitioner might have difficulty in diagnosing an unusual illness because he does not know the specific disease, because he has had no experience in detecting it, or because the disease is completely unknown.

As the doctor acquires broader experience and his tools become more numerous and refined, he can evaluate specific items in the general examination with a higher degree of precision and reliability. Accordingly, the results of his general examination gradually approach a total evaluation of his patient's health.

The measure of success of an activity is how well it achieves its intended purpose. This principle applies no matter what the purpose, whether it is to raise curiosity, to inform, or to produce action.

Health materials or programs may also provide information or influence behavior in some way other than the one intended. A person reading a health pamphlet, seeing an exhibit, or having some other educational experience may find in it something that directly ties in with his experiences and interests and thereby helps him to achieve his own goals. His knowledge, understanding, and behavior may all be influenced. He would probably consider the materials or program very successful.

From the point of view of the educator, however, such materials or programs should not be considered successful unless the intended objectives are also achieved. It matters not if the action caused is even more desirable than the action hoped for. To interpret as indications of success evidence of behavior changes other than those intended is to set up *post hoc* objectives.

Success, from the viewpoint of those who plan materials or programs, need not conflict with success from the standpoint of the persons for whom they are planned. Studies of human behavior suggest that educators will be most effective in achieving their purposes when such purposes are defined in terms of the wants and goals of members of the intended audience and are tied in with their way of life.

Criterion of Effectiveness

Concrete evidence that an objective has been achieved is the only realistic criterion for measuring effectiveness. Such evidence should be distinguished from criteria which measure some of the conditions necessary to achieve the objective.

The number of items of material distributed, the number of persons attending a movie or exhibit, the amount of attention attracted by exhibits or other materials, the level of readability, and similar items represent conditions

necessary for effectiveness, although they are sometimes cited as measures of effectiveness. Certainly a movie, an exhibit, or a lecture must be seen, read, or heard to be effective, but that may not be sufficient. The observer may still be left uninformed, misinformed, or with negative attitudes, and may take no action.

The difference between conditions necessary for effectiveness and evidence of effectiveness itself is generally accepted in psychological research but is not yet widely recognized in health education. Attention has been called to it by Derryberry (*5*) as follows:

> . . . in the past, counts of the numbers of spectators and average observation time have been cited as positive evidence of an exhibit's effectivness. However, such records do not constitute positive evidence of the effectiveness of exhibits, because the records fail to indicate what, if anything, the spectator learns. Certainly there is no assurance that he is learning the message intended. So far as can be detected from observations, the visitor may be drawing wrong conclusions from the material in the display. Consequently, it is apparent that such records are valuable only in a negative sense—negative in that an exhibit cannot be effective as an educational medium if it fails to attract attention of visitors or fails to sustain their interest long enough for them to complete inspection of it.

The failure of a program to satisfy the conditions necessary for effectiveness leads to a screening out of some members of the potential audience. For example, all members of the potential or intended audience who did not receive a pamphlet, attend a movie, or see an exhibit (were not exposed to the educational effort) are eliminated because one of the conditions for effectiveness (exposure) was not met. Similarly, lack of interest and understanding will screen out other members of the intended audience. The fact that some individuals were not screened out by these limiting conditions and did participate in the program is not adequate evidence, however, that the program was successful for them (*6*).

Selection of Methods

The method used to evaluate a program should be especially selected or constructed in terms of the particular goals to be reached. Accordingly, evaluation plans should be developed along with program plans. Developing evaluation plans at this time will help to assure that the goals are specific and that steps are taken to obtain an adequate base line from which to measure change. The evaluation approach and findings can thus be tied in more closely to program needs, goals, and methods so that the findings will be of maximum use to those carrying on the educational program.

Two serious hazards are involved in the alternative practice of developing a list of evaluation techniques and then selecting from this list certain procedures to measure a program's achievement. First, the technique most effective for evaluating one program may prove worthless in another because of differences in goals or in methods of approach. No one technique of evaluation is adequate for all situations. Secondly, there is always the danger that some technique will look particularly interesting and changes will be made in the program to facilitate its use. This aspect of technique influencing the definition of problems and goals is one of the greatest dangers in social research (*7*).

The Base Line

The measures used to evaluate health education seldom start from absolute zero. Individuals have invariably acquired some health knowledge, attitudes, and practices before a program starts. A base line of zero cannot usually be assumed.

The evaluator who studies the effectiveness of a nutrition education program, for example, must recognize that individuals already have considerable information about food, although some of it may be incorrect. They have also developed definite food attitudes and practices before participating in the program. Some base line of their present knowledge, attitudes, and behavior, therefore, must be obtained prior to estimating changes.

Such a base line should be viewed as a relative rather than an absolute starting point. It usually describes the average situation at the beginning of the program and indicates the degree to which individuals vary about this average. Gains should be interpreted as progress from this average starting point rather than as progress from zero.

A corollary to the preceding concept is that the measurements employed in evaluating health education seldom, if ever, have equal psychological units. The units within a scale of measurement usually vary somewhat, making interpretation of data difficult.

For example, it is erroneous to infer that a person who scores zero on a test has no information, positive attitudes, or practices, or that a person who gets a perfect score is completely informed and wholly positive in attitude and action. Likewise, a person who receives a score of 80 cannot be considered to be twice as educated as one who obtains a score of 40. Even individuals who obtain identical scores cannot be assumed to have identical knowledge or understanding.

The Indirect Nature of Measurements

Evaluative measurements are nearly always indirect measures of the effects of the program on behavior. The findings of evaluation must be interpreted with full recognition of the specific indices used for measurement.

The personal and social variables being measured in a health education program are more complex than the variables in physical objects. For example, units of measurement for weighing yield only indirect evidence of the weight of an object. The standardized unit for such weighing, however, has been in use for so long that weight given in these units is accepted as direct evidence of the object's weight.

No comprehensive standards have been developed to measure all the personal and social variables in human behavior. New scales of measurement must be devised and validated almost every time one attempts to determine the amount and accuracy of a change in a person's information, the direction, extent, and intensity of a shift in attitudes, or the nature and direction of an adjustment in behavior. Each scale of measurement so developed provides only sample evidence on the behavior being measured.

As Thorndike (*8*) has pointed out, intelligence cannot be measured directly, nor is it known for certain what intelligence represents. Intelligence tests measure the effects or products of intelligence. They have proved useful for interpreting behavior and for making predictions about future behavior. In interpreting the findings from such tests, however, it is essential to bear in mind that intelligence is inferred from indirect evidence.

Likewise, in attempting to measure attitudes or changes in behavior, the data are limited to the things that can be observed in verbal or physical behavior. Great caution should be observed in imputing meanings or motivations to the data observed.

Planning for Future Needs

Each practical evaluation should be planned to satisfy long-range needs of health education while meeting the immediate project requirements. Each study will then contribute toward the testing of some long-range hypothesis or principle without much additional cost or effort. The findings of different studies will supplement each other in a more meaningful way while unrecognized duplication of effort is minimized. Otherwise, evaluations may yield isolated bits of information that contribute little or nothing toward improving educational methods. The findings should help to answer the challenges so often made: If this won't work, what will? How can this evaluation help us to do it better the next time? How can we relate these results to the findings of other studies?

Thus, evaluators are faced with two questions. The first is: How can evaluations of a specific program be made more meaningful and useful to those responsible for achieving immediate program goals? The answer to this question calls for better experimental design for each study.

The second question is: How can an evaluation of a specific program be made to furnish data for long-range needs? The answer to this more fundamental question requires planning at a broader level. As Marquis (*9*) has pointed out:

> Research planning can be carried out at different levels. I would like to distinguish three levels which I will call experimental design, program design, and policy design. Experimental design is the planning of a single specific project. Program design is the planning of an integrated set of projects focused on a central problem. Policy design is a new word for over-all planning of the

distribution of effort among programs, areas, or fields.

The field of evaluation in health education is particularly weak in the program and policy design levels of research planning. If studies of evaluation are planned in terms of these broader frameworks, the evidences that accumulate will gradually satisfy the long-term as well as the short-term needs of health education and provide a sound basis for program planning. Is it reasonable to anticipate that from such studies might eventually develop a science of health education?

The problems involved in measuring personal and social variables might lead some people to say that the effectiveness of health education in changing behavior cannot be measured. This defeatist viewpoint has no basis in fact. To cite Thorndike, "Whatever exists at all exists in some amount" (*10*) and can, therefore, be measured. As the programs of health education are more clearly conceptualized, effective means can and will be developed to evaluate them.

Summary

Basic concepts that should be considered in evaluating any health education program are:

1. Planning evaluation studies of health education requires adequate exploratory fact-finding.

2. The broad purposes of an educational program must be broken down into specific, concrete, definable goals before evaluation can be undertaken.

3. The interrelationship between the findings on the achievement of specific goals must also be considered.

4. The measure of success of an activity is how well it achieves its intended purpose.

5. Concrete evidence that an objective has been achieved is the only realistic criterion for measuring effectiveness.

6. The method used to evaluate a program should be especially selected or constructed for that program in terms of the goals of the program.

7. The measures used to evaluate health education seldom start from absolute zero.

8. Evaluative measurements are nearly always indirect measures of the effects of the program on behavior.

9. Each practical evaluation should be planned to satisfy long-range needs of health education while meeting the immediate project requirements.

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From 1943 to 1950

Studies in Penicillin Treatment of Syphilis

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More than 7 years have elapsed since the efficacy of penicillin in the treatment of early syphilis was first reported (*1*). In this relatively short period, penicillin has been adopted throughout the United States, and much of the world, for the treatment of all stages of syphilis. Concepts of epidemiology, immunology, serology, and treatment have been radically altered. The hazards of the antisyphilitic therapies of the past have been eliminated; the treatment period has been shortened from years to days; and a modern type of "therapia sterilisans magna" has been realized. These factors have brought about many necessary adjustments as well as advantageous developments in the administrative, clinical, and educational phases of venereal disease control.

Of the several specifications for an ideal therapy, cure of all patients is of primary importance. Unfortunately, this goal has not yet been attained. All treatment schedules, both old and new, which have been used on 100 or more patients with early syphilis have had true failures or relapses in addition to established reinfections. Nevertheless, penicillin excellently fulfills the aims of a practical therapy—to cure with safety, simplicity, and economy a high percentage of those treated in the early stages.

During these formative 7 years there have been many improvements in the antibiotic agent and in the complementary vehicle for administration. The subsequent adoption in rapid succession of various therapeutic schedules and drug refinements has made comparative evaluation difficult; but it has provided comprehensive experimental data upon which the optimal time-dose relationship can be established. From the variety of studies thus engendered it has become clear that penicillin therapy can safely and quickly eliminate the early infectiousness, as well as the potential late complications of the disease, in all who respond to standard treatment. Only a small minority need individualized re-treatment at a later date.

This paper reviews the results of the studies in developing penicillin therapies undertaken from 1943 to 1950 in the venereal disease research laboratory. Throughout this period our patients were predominantly young white males; only about 3 percent of the total study group were females. All clinical diagnoses were confirmed by laboratory findings and, so far as is known, no previous therapy for early syphilis had been received by any of the patients included in the study groups. The ratio of primary to secondary syphilis is indicated in the accompanying tables for the various treatment schedules. All patients were hospitalized for pretreatment diagnostic study, for therapy, and, whenever possible, for special post-treat-

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ment examination when reinfection or treatment failure was suspected or when serologic reactivity was unusual.

Early Penicillin Schedules

After animal experimentation indicated that penicillin possessed spirocheticidal activity, a human pilot study was initiated in June 1943 (*1*). In this study four men with darkfield-positive primary syphilis received 1,200,000 units of amorphous penicillin in aqueous solution, in 48 doses of 25,000 units each, administered intramuscularly at 4-hour intervals for 8 days. When the four men were re-examined 6 years later, detailed clinical examinations and serologic studies were negative (*2*). Three of the men had maintained seronegativity since the second or third post-treatment month. The fourth had been clinically negative 10 days after therapy and serologically negative in a battery of diagnostic tests at 71 days. The negative findings persisted up to 286 post-treatment days, when his serology showed strongly positive; clinical examination revealed a new darkfield-positive chancre on the lip, and an acute gonococcal urethritis. Following a second course of penicillin, the clinical manifestations disappeared and the blood tests reverted to negativity.

These four patients, as well as many others, have been successfully treated with aqueous penicillin, as indicated by 36 or more months of observation. With each of the several time-dosage combinations which have been tried, a good proportion of observed patients quickly reached and maintained both clinical and serologic negativity. Although failure rates in certain schedules were too high for practical purposes, the over-all picture confirms the efficacy and adaptability of penicillin in the treatment of early syphilis.

Aqueous Penicillin Schedules

The second treatment schedule used at this laboratory consisted of 20,000 units of aqueous amorphous penicillin administered intramuscularly every 3 hours for a total of 60 doses, or 1,200,000 units (table 1, schedule A). An early review of this schedule indicated that it might be unsatisfactory (*3*); and by 21 post-treatment months a cumulative re-treatment rate of 32.8 percent among the secondary syphilis patients confirmed the earlier decision to seek a more effective regimen.

The total dosage was doubled for the next schedule: 40,000 units of penicillin was administered intramuscularly every 3 hours for 60 doses, or 2,400,000 units. The cumulative re-treatment rate for secondary syphilis patients was 20.1 percent by 21 months (table 1, schedule B). It should be pointed out that the numbers of patients so far treated and observed were small in each diagnostic category, which made comparison of rates somewhat difficult between schedules. Nevertheless, in this latter schedule, the re-treatment rates as well as the seronegativity rates among observed patients showed, in general, considerable improvement over the previous schedule. In addition, it can be stated that among our predominantly male patients there were proportionately fewer clinical and serologic failures observed with 2,400,000 units than with 1,200,000 units. Space limitations, however, do not permit showing the reasons for re-treatment on the accompanying tables. Sternberg and Leifer (*4*) reported good results with 2,400,000 units of amorphous penicillin administered to a large group of young males on the same time-dosage regimen.

Elsewhere, evaluation studies by the Division of Venereal Disease of the Public Health Service, based exclusively on patients treated for secondary syphilis, showed similar cumulative re-treatment rates by 21 months: 27.6 percent with 1,200,000 units, and 22.4 percent with 2,400,000 units of aqueous amorphous penicillin (*5*). However, these studies included much larger groups of patients, both male and female, white and nonwhite, drawn from several clinics. On such a basis, it became clear that the larger dosage of amorphous penicillin offered no essential advantages over the smaller dosage.

In the present report, we have used the method of statistical evaluation developed and employed by the Division of Venereal Disease, Public Health Service (*6*). However, it should be remembered that our patients were predominantly young white males—a factor which might be expected to produce differences from

Table 1. Treatment of early syphilis with amorphous penicillin

Observation period (months)	Seronegative primary			Seropositive primary			Secondary		
	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative
A. 1,200,000 units (20,000 units every 3 hours for 7½ days)									
0–1	16	0. 0	100. 0	38	0. 0	0. 0	39	0. 0	0. 0
1–2	15	0	100. 0	35	0	28. 6	35	0	2. 9
2–3	15	0	100. 0	34	0	47. 1	35	8. 6	5. 7
3–4	14	0	100. 0	32	0	59. 4	34	14. 5	8. 8
4–5	14	0	100. 0	31	3. 2	58. 1	34	23. 3	17. 7
5–6	14	0	100. 0	31	3. 2	64. 5	34	23. 3	20. 6
6–7	14	0	100. 0	31	3. 2	64. 5	33	26. 4	21. 5
7–8	14	0	100. 0	31	3. 2	64. 5	33	26. 4	27. 6
8–9	14	0	100. 0	31	3. 2	67. 7	33	26. 4	27. 6
9–10	14	7. 1	92. 9	31	3. 2	71. 0	33	26. 4	27. 6
10–11	14	7. 1	92. 9	29	3. 2	72. 6	33	26. 4	27. 6
11–12	14	7. 1	92. 9	28	3. 2	71. 7	33	26. 4	30. 7
12–15	14	7. 1	92. 9	28	10. 4	71. 7	33	26. 4	33. 7
15–18	14	7. 1	92. 9	28	17. 6	64. 5	31	26. 4	38. 4
18–21	14	7. 1	92. 9	28	21. 2	60. 9	31	32. 8	38. 4
21–24	14	7. 1	92. 9	28	21. 2	60. 9	31	32. 8	41. 6
24–30	13	7. 1	92. 9	27	21. 2	60. 1	31	32. 8	41. 6
30–36	12	7. 1	92. 9	25	21. 2	63. 1	31	32. 8	41. 6
36–48	12	7. 1	92. 9	25	21. 2	78. 9	30	32. 8	60. 5
48–60	11	7. 1	92. 9	20	21. 2	78. 9	24	32. 8	67. 2
60–72	8	7. 1	92. 9	15	21. 2	78. 9	21	32. 8	67. 2
72–84	3	7. 1	92. 9	8	21. 2	78. 9	9	32. 8	67. 2
B. 2,400,000 units (40,000 units every 3 hours for 7½ days)									
0–1	26	4. 2	100. 0	38	0. 0	0. 0	34	0. 0	0. 0
1–2	24	8. 6	83. 3	37	0	18. 9	32	0	0
2–3	23	8. 6	87. 1	37	2. 7	43. 2	31	6. 5	6. 5
3–4	23	8. 6	87. 1	37	2. 7	64. 9	31	13. 0	16. 1
4–5	23	8. 6	87. 1	37	2. 7	73. 0	30	16. 3	30. 1
5–6	22	8. 6	86. 9	32	2. 7	81. 6	30	16. 3	33. 5
6–7	21	8. 6	86. 7	31	2. 7	81. 1	30	16. 3	40. 2
7–8	19	8. 6	86. 1	30	2. 7	83. 9	27	16. 3	43. 7
8–9	19	8. 6	86. 1	30	2. 7	87. 2	26	20. 1	45. 7
9–10	17	8. 6	85. 8	29	2. 7	90. 3	25	20. 1	48. 0
10–11	17	8. 6	85. 8	29	2. 7	90. 3	25	20. 1	48. 0
11–12	17	8. 6	85. 8	28	2. 7	90. 1	25	20. 1	48. 0
12–15	17	8. 6	91. 5	27	2. 7	89. 8	23	20. 1	57. 7
15–18	16	8. 6	91. 5	27	6. 4	86. 1	23	20. 1	62. 2
18–21	16	8. 6	91. 5	21	6. 4	84. 2	21	20. 1	65. 8
21–24	16	8. 6	91. 5	19	6. 4	83. 2	20	20. 1	65. 0
24–30	14	8. 6	91. 5	19	6. 4	88. 4	19	20. 1	69. 3
30–36	13	8. 6	91. 5	18	6. 4	88. 1	15	20. 1	79. 9
36–48	10	8. 6	91. 5	17	6. 4	87. 7	15	20. 1	79. 9
48–60	8	8. 6	91. 5	16	6. 4	87. 3	13	20. 1	79. 9
60–72	3	8. 6	91. 5	6	6. 4	93. 6	6	20. 1	79. 9

results shown in other studies in evaluation of a particular therapy. One report on the probable influence of the factors of race, sex, and stage of syphilis on results of therapy (*7*) indicates that white males will usually have a lower re-treatment rate than Negro males in the two primary stages of syphilis; that in white male patients the cumulative re-treatment rate for secondary syphilis will be higher than the rates observed in seronegative and seropositive primary syphilis; but that no significant differences were observed between the four groups (white and Negro, male and female) in patients treated for secondary syphilis.

Experiments with aqueous amorphous penicillin solutions indicated that when the interval

Table 1. Treatment of early syphilis with amorphous penicillin—Continued

Observation period (months)	Seronegative primary			Seropositive primary			Secondary		
	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative
C. 1,700,000 units (20,000 units every 2 hours for 7 days)									
0–1	65	0.0	80.0	126	0.0	6.3	84	0.0	1.2
1–2	65	0	93.8	125	.8	16.8	84	0	3.6
2–3	62	1.6	96.8	123	1.6	39.0	81	0	7.4
3–4	60	4.9	93.4	123	4.0	62.6	81	1.2	22.2
4–5	57	4.9	93.3	119	4.0	70.7	79	1.2	38.0
5–6	56	6.7	93.3	114	4.9	81.9	79	1.2	44.3
6–7	54	8.6	91.4	112	4.9	85.2	77	2.5	49.4
7–8	50	8.6	91.4	107	5.8	85.7	76	5.1	55.3
8–9	49	8.6	91.4	101	6.8	86.2	75	7.8	60.1
9–10	48	10.7	89.3	100	7.8	86.1	75	7.8	64.1
10–11	48	10.7	89.3	99	7.8	87.1	74	7.8	66.4
11–12	46	10.7	89.3	97	7.8	87.0	71	12.1	65.2
12–15	45	12.9	87.1	94	7.8	86.8	71	14.9	65.2
15–18	42	15.3	84.7	90	7.8	86.5	68	26.6	64.5
18–21	40	15.3	84.7	88	10.1	84.2	64	26.6	64.0
21–24	39	15.3	84.7	86	10.1	85.2	59	28.3	66.5
24–30	37	15.3	84.7	80	11.3	83.6	54	30.1	64.3
30–36	31	21.8	78.2	72	11.3	83.1	47	32.2	63.5
36–48	24	21.8	78.2	56	13.1	83.3	43	32.2	63.0
48–60	18	21.8	78.2	32	13.1	86.8	34	32.2	64.7
60–72	3	21.8	78.2	8	13.1	86.8	4	32.2	67.7
D. 3,400,000 units (40,000 every 2 hours for 7 days)									
0–1	87	0	65.5	272	0	2.6	189	0	1.1
1–2	85	0	83.5	270	0	24.8	189	0	4.2
2–3	84	0	97.6	259	0	51.7	186	0	12.9
3–4	84	1.2	97.6	255	.8	74.5	183	.5	36.6
4–5	83	2.4	96.4	249	1.2	82.7	179	.5	55.3
5–6	78	3.7	95.0	246	1.2	87.0	177	.5	54.8
6–7	77	3.7	95.0	244	2.0	89.4	172	.5	61.6
7–8	75	3.7	95.0	231	2.4	90.6	168	1.1	70.9
8–9	74	3.7	95.0	221	2.9	91.2	164	1.7	73.8
9–10	72	7.9	92.1	219	3.8	91.2	160	1.7	76.3
10–11	72	7.9	92.1	211	3.8	92.4	157	2.3	79.1
11–12	71	7.9	92.1	209	3.8	92.4	151	3.0	81.0
12–15	68	9.4	90.7	203	4.8	91.8	145	3.7	83.2
15–18	64	9.4	90.7	195	5.3	91.6	139	4.4	86.2
18–21	60	9.4	90.7	180	7.5	90.8	128	5.2	86.9
21–24	56	9.4	90.7	164	7.5	90.6	120	6.0	88.1
24–30	52	9.4	90.7	154	8.8	89.2	112	8.7	86.8
30–36	43	9.4	90.7	129	8.8	91.2	98	10.8	84.1
36–48	33	9.4	90.7	118	10.5	89.5	87	11.9	84.6
48–60	18	9.4	90.7	49	12.5	87.4	43	14.2	83.4
60–72	4	9.4	90.7	9	12.5	87.5	3	14.2	85.7

between injections was reduced from 3 hours to 2 hours more constant and higher penicillin blood levels could be maintained in a larger proportion of patients (*8*). Consequently, in the next investigative schedule the interval between injections was reduced: 20,000 units (amorphous) was given every 2 hours for 85 injections, to a total of 1,700,000 units. By 21 post-treatment months the cumulative re-treatment rate for secondary syphilis under this schedule was 26.6 percent among observed patients (table 1, schedule C).

Then a 3,400,000-unit schedule, consisting of 85 intramuscular injections of 40,000 units of aqueous amorphous penicillin every 2 hours, was tried (*9*). The cumulative re-treatment rate

for secondary syphilis at the end of 21 months of observation was 5.2 percent among followed patients, and the seronegativity rate (86.9 percent) was good (table 1, schedule D). This schedule was considered to be effective, but the 7 days of hospitalization required for the completion of treatment and the frequency of injections—which necessitated costly medical supervision—were undesirable from an administrative viewpoint. Hence, the next step was to determine the fewest number of days in which the disease could be cured or how long and in what concentration penicillin had to be maintained in the body to obtain cure among the greatest possible percentage of patients.

The Chicago Intensive Treatment Center had meanwhile reported that early syphilis could be cured in about half the patients treated with massive aqueous penicillin therapy administered by intravenous drip for 24 hours (*10*). Although the adoption of such a schedule was not feasible because of its excessive failure rate, it was significant that even a small percentage of early syphilis in man could be cured with only 24 hours of aqueous penicillin therapy.

Experimental studies demonstrated that early syphilis in animals could be cured with aqueous penicillin administered for 12, 18, 24, and 48 hours, respectively (*11*, *12*). Many of the syphilitic animals were cured by 12 to 24 hours of continuous treatment; but maximum effectiveness was obtained with 72 hours of therapy. In other words, the cure rate rose sharply when adequate blood levels of penicillin were maintained in the animals for 72 hours.

On the basis of the assumption that the optimal duration of therapy for early syphilis in man—curative penicillin concentrations in the body—would be less than 8 days but more than 1, and on the basis of the information gained from the animal experiments, a 3-day schedule was established for clinical trial (*13*). The duration of therapy in this schedule (table 2, schedule A) was 70 hours; duration of significant penicillin concentrations in the serum, at least 78 hours. Since the individual dose of 200,000 units was probably far in excess of the optimal dosage, it was believed that treatment failures could be attributed to shortened duration rather than to inadequate dosage of penicillin. The cumulative re-treatment rate for this schedule among secondary syphilis patients was only 4.0 percent at the end of 21 months of observation, indicating that in our experience early syphilis responds just as favorably to 3 days of treatment as to 7 days. This result demonstrated again that penicillin is effective as the sole therapeutic agent and that adequate penicillin schedules do not need the therapeutic support of the arsenic or heavy-metal drugs.

In an effort to reduce further the time required for treatment, a 2-day schedule was evolved (table 2, schedule B). There was early evidence that 2 days of therapy would not be as effective as 3 days. The re-treatment rate by 6-month periods was 11.1 among secondary syphilis patients. This schedule was therefore abandoned.

The favorable response to 3 days of adequate penicillin serum concentration appeared to be the key to the solution of the time factor in the ambulatory management of syphilis, and to the efficient utilization of slowly absorbed penicillin salts in repository vehicles. Further studies were necessary to determine the minimum therapeutic dosage.

Slowly Absorbed Penicillins

To obviate the necessity of frequent injections of penicillin, investigators had been experimenting with vehicles which would slow the absorption rate of penicillin, and had developed sparingly soluble salts of the antibiotic. The initial success was scored by Romansky and Rittman (*14*) when they incorporated penicillin in peanut oil and beeswax. This product was quickly adopted for the treatment of early syphilis, with favorable results (*15*, *16*, *17*). In 1947 our experiments with the beryllium salts of penicillin showed excellent level-sustaining properties, but the investigation was shortly abandoned because of the danger of toxicity from the beryllium salts. Early in 1948, procaine penicillin G in oil became available and, according to our understanding, received its first clinical application to the treatment of syphilis at the venereal disease research laboratory. Shortly after, Buckwalter and Dickison (*18*) introduced the principle for the most satisfactory of the

Table 2. Treatment of early syphilis with aqueous crystalline penicillin G

Observation period (months)	Seronegative primary			Seropositive primary			Secondary		
	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative
A. 7,200,000 units (200,000units every 2 hours for 3 days)									
0–1	110	0. 0	93. 6	176	0. 0	4. 5	89	0. 0	0. 0
1–2	110	0	95. 5	174	1. 1	26. 4	89	1. 1	2. 2
2–3	107	1. 9	96. 3	167	1. 1	56. 9	87	1. 1	6. 9
3–4	101	2. 9	96. 1	164	1. 1	79. 3	83	1. 1	25. 3
4–5	99	5. 9	94. 1	162	1. 1	89. 0	81	1. 1	48. 2
5–6	96	6. 9	93. 1	157	1. 1	91. 2	80	1. 1	57. 6
6–7	93	6. 9	93. 1	156	1. 7	90. 5	76	1. 1	63. 3
7–8	93	6. 9	93. 1	154	1. 7	92. 4	73	2. 5	75. 5
8–9	92	6. 9	93. 1	152	2. 4	92. 3	71	2. 5	80. 5
9–10	89	6. 9	91. 9	148	2. 4	92. 1	70	2. 5	81. 7
10–11	89	8. 0	91. 9	145	2. 4	93. 4	69	4. 0	84. 4
11–12	87	8. 0	91. 9	139	3. 1	93. 2	67	4. 0	87. 0
12–15	86	8. 0	91. 9	133	3. 1	93. 8	62	4. 0	86. 4
15–18	79	9. 3	90. 7	125	3. 9	94. 4	56	4. 0	87. 2
18–21	68	10. 8	89. 2	115	3. 9	94. 3	52	4. 0	88. 4
21–24	59	12. 5	87. 5	108	3. 9	94. 2	48	4. 0	87. 7
24–30	51	12. 5	87. 5	97	4. 9	95. 0	41	4. 0	88. 7
30–36	37	12. 5	87. 5	73	6. 3	93. 6	31	7. 2	92. 9
36–48	16	12. 5	87. 5	30	9. 6	90. 3	20	17. 0	83. 1
B. 7,200,00 units (300,000 units every 2 hours for 2 days)									
0–1	19	0. 0	78. 9	42	0. 0	2. 4	29	0. 0	3. 4
1–2	18	0	94. 4	42	0	28. 6	29	0	3. 4
2–3	16	0	93. 8	39	2. 6	69. 2	28	0	10. 7
3–4	16	0	100. 0	38	2. 6	86. 9	27	0	29. 6
4–5	16	0	100. 0	36	5. 4	89. 1	27	11. 1	44. 4
5–6	16	0	100. 0	35	5. 4	88. 9	27	11. 1	55. 6
6–7	15	6. 7	93. 3	33	8. 5	91. 6	27	11. 1	63. 0
7–8	15	6. 7	93. 3	32	8. 5	91. 6	27	11. 1	63. 0
8–9	15	6. 7	93. 3	32	8. 5	91. 6	27	11. 1	66. 7
9–10	15	6. 7	93. 3	32	8. 5	91. 6	27	11. 1	74. 1
10–11	15	6. 7	93. 3	32	8. 5	91. 6	27	11. 1	74. 1
11–12	15	6. 7	93. 3	31	8. 5	91. 6	25	11. 1	76. 8
12–15	15	6. 7	93. 3	28	8. 5	91. 6	24	11. 1	76. 2
15–18	15	6. 7	93. 3	25	8. 5	91. 6	24	11. 1	76. 2
18–21	15	6. 7	93. 3	24	8. 5	91. 6	20	11. 1	79. 0
21–24	14	6. 7	93. 3	20	8. 5	91. 6	16	11. 1	82. 5
24–30	10	6. 7	93. 3	12	8. 5	91. 6	14	11. 1	81. 5

sparingly soluble penicillin repository preparations in current use—procaine penicillin G in oil gelled with 2 percent aluminum monostearate.

An intensive study was made in the venereal disease research laboratory to determine the predictable results of the administration of varying amounts of this latest preparation. Seventy-two hours after single injections of 300,000 (1 cc.) and 600,000 units (2 cc.), detectable levels of penicillin were found in 97 and 96 percent, respectively, of the patients treated (table 3). Detectable levels were observed in some of the patients for longer periods, but it was felt that maintenance of levels beyond the seventy-second hour was not necessary.

In our first experimental schedule utilizing procaine penicillin in oil with 2 percent alumium monostearate, 600,000 units was administered intramuscularly once daily for 3 days (*19*). By this time we noted a distinct decrease in the numbers of patients available to us for inclusion in therapy evaluation studies. This was an encouraging trend, but the difficulty of finding suitable patients is reflected in table 4,

Table 3. Penicillin levels of blood after single injection of procaine penicillin G in oil with 2 percent (w/v) aluminum monostearate

Dose of penicillin (units)	Total patients	Percent of total patients showing detectable levels at 72 hours	Average penicillin blood levels (units per cc. of serum) among patients showing a detectable concentration			
			24 hours	48 hours	72 hours	96 hours
300, 000	374	97. 0	0. 094	0. 060	0. 042	0. 034
600, 000	98	96. 0	. 205	. 122	. 111	. 077
900, 000	21	100. 0	. 245	. 185	. 153	. 124

schedule A. In spite of the small numbers in each diagnostic category, however, this schedule showed good results, in our opinion, and offered an adaptable regimen for outpatient therapy in early syphilis. No clinical relapses were noted among primary and secondary syphilis patients who remained under observation; and only 2 patients (with secondary syphilis) were re-treated on the basis of serology. By the fifteenth post-treatment month, the cumulative re-treatment rate in the secondary syphilis group was 14.5 percent (probable reinfection rate, 7.1; serologic failure rate, 7.4).

Single-dosage Schedules

In the next schedule studied, a single dosage of 900,000 units of procaine penicillin G in oil with 2 percent aluminum monostearate was used. Twenty patients were treated for primary or secondary syphilis. Sixteen of the patients were observed at the third post-treatment month, and 10 patients were seen at 15 months. One of the observed group was reinfected at 154 days and was re-treated with the same dosage. After re-treatment, clinical manifestations disappeared and blood tests reverted to negativity for the second time, and remained so. Another patient had positive spinal fluid findings when observed at 448 days; and was re-treated with 600,000 units daily for 6 days. The 900,000-unit schedule was discontinued at our laboratory when it was noted that other investigators were using a slightly larger single dosage—1,200,000 units (*20*). However, our investigation of single-dosage therapy was continued with smaller amounts of penicillin.

Alexander and Schoch (*21*, *22*) and Plotke and associates (*23*) had shown the dramatic effect of abortive or prophylactic therapy in contacts exposed to active syphilitic infections. We believed that experimentation with a penicillin dosage lower than theirs would yield significant information on the response in syphilis to the therapy generally used for gonorrheal infections. More than 100 patients with early infectious syphilis were treated with a single intramuscular injection of 300,000 units of procaine penicillin in oil with 2 percent aluminum monostearate. Special studies were made of penicillin serum concentrations, clinical and serologic reactions to therapy, and response to re-treatment (*8*, *19*, *24*). Full reports on certain aspects of these studies will be published at a later date. No treatment failures were observed in the seronegative primary syphilis group, but the otherwise high cumulative re-treatment rates of the 300,000-unit schedule led to its discontinuance. By 12 months the re-treatment rate was 28.4 for secondary syphilis, and 12.7 for seropositive primary syphilis; and additional failures were seen after this period (table 4, schedule B). Nearly all the re-treated cases were true treatment failures, including one with positive spinal fluid findings. However, three significant facts were revealed: (*a*) seronegative primary syphilis shows adequate response to a single injection of 300,000 units of procaine penicillin G with aluminum monostearate; (*b*) a large percentage of patients with seropositive primary syphilis can be expected to respond satisfactorily to as little as 300,000 units of this penicillin product; and (*c*) a single-injection or one-session schedule of intramuscular penicillin therapy can be developed for the cure of early syphilis, dependent upon the determination of the proper dosage of a slowly absorbed compound of the drug.

Serum concentration studies indicated that

600,000 units of procaine penicillin in oil with 2 percent aluminum monostearate might be expected to produce a more effective therapy than 300,000 units (table 3). To determine the minimal effective dosage for a majority of patients—a matter of extreme importance in areas where penicillin is scarce or expensive—an experimental single-dosage schedule of 600,000 units was set up. Results are inconclusive at this writing because of too few patients and insufficient observation. Eighteen patients with primary or secondary syphilis were treated; 14 of these were seen at the third month and 10 remained under observation at the seventh month. So far no failures or reinfections have been observed among the small group.

Central Nervous System Syphilis

It has been difficult to evaluate the therapeutic effect of the different penicillin schedules on syphilis of the central nervous system. One of the reasons for the difficulty has been that only a limited number of such patients were admitted for therapy. The results of studies of penicillin concentrations in the blood and spinal fluid have been influential in formulating our current therapy for this complication. In one study (*25*), penicillin levels in the cerebrospinal fluid were determined on 198 specimens taken from 114 patients at various time intervals during and after a regimen of six daily injections of procaine microcrystal penicillin in oil with 2

Table 4. Treatment of early syphilis with procaine penicillin G in oil with 2 percent aluminum monostearate

Observation period (months)	Seronegative primary			Seropositive primary			Secondary		
	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative	Total cases observed	Cumulative percent re-treated	Percent sero-negative
A. 1,800,000 units (600,000 units once daily for 3 days)									
0–1	20	0.0	95.0	37	0.0	5.4	31	0.0	0.0
1–2	19	0	100.0	35	0	34.3	31	0	3.2
2–3	18	0	100.0	34	0	52.9	31	0	19.4
3–4	18	0	100.0	34	0	70.6	29	0	27.6
4–5	18	0	100.0	33	3.0	78.8	28	0	42.9
5–6	18	5.6	94.4	33	6.0	78.8	28	7.1	53.6
6–7	17	5.6	94.4	33	9.0	78.8	27	10.8	66.9
7–8	17	5.6	94.4	33	12.0	78.8	27	14.5	74.3
8–9	17	5.6	94.4	32	12.0	78.5	27	14.5	78.0
9–10	17	5.6	94.4	31	12.0	78.1	26	14.5	81.5
10–11	16	5.6	94.4	31	15.3	78.1	25	14.5	81.4
11–12	14	5.6	94.4	31	15.3	78.1	23	14.5	85.4
12–15	14	5.6	94.4	30	15.3	77.9	23	14.5	85.4
15–18	14	5.6	94.4	27	15.3	80.9	22	14.5	85.4
18–21	11	5.6	94.4	26	15.3	80.8	16	14.5	85.4
21–24	11	5.6	94.4	26	15.3	80.8	14	14.5	85.4
24–30	5	5.6	94.4	11	24.7	75.2	9	14.5	85.4
B. 300,000 units—single injection									
0–1	38	0.0	94.7	64	0.0	3.1	33	0.0	0.0
1–2	38	0	97.4	63	0	39.7	33	0	3.0
2–3	35	0	100.0	60	1.7	61.7	33	0	15.2
3–4	33	0	100.0	60	5.0	75.0	32	0	28.1
4–5	32	0	100.0	57	10.3	79.2	30	3.3	30.0
5–6	31	0	100.0	51	10.3	80.0	28	10.5	28.6
6–7	30	0	100.0	50	10.3	81.7	28	21.2	28.6
7–8	27	0	100.0	46	10.3	83.2	28	28.4	28.6
8–9	23	0	100.0	45	10.3	83.0	28	28.4	32.2
9–10	23	0	100.0	41	12.7	82.4	28	28.4	35.8
10–11	22	0	100.0	40	12.7	82.3	27	28.4	37.7
11–12	20	0	100.0	39	12.7	82.2	27	28.4	37.7
12–15	19	0	100.0	34	12.7	81.5	21	33.2	43.0
15–18	12	0	100.0	25	20.6	75.4	16	39.3	36.5

percent aluminum monostearate, in doses of 600,000 units. Detectable levels of penicillin were obtained from 2 to 290 hours after beginning the injections, with 82 percent of the specimens showing a level at 31 hours and 91 percent at 122 hours. Between 31 hours and 194 hours, penicillin was detectable in 75 percent of 110 specimens. On the basis of this and other supporting data (*8*), we adopted the schedule of 600,000 units for six daily consecutive doses for the treatment of central nervous system syphilis.

Favorable response has been reported by Dattner, Curtis, Stokes, and their co-workers (*26–28*) and by other authors in nearly all complications of the nervous system when penicillin without adjuvant therapy is used. Research groups in the United States are almost unanimously agreed that arsenic and bismuth are without value as adjuvants to penicillin in the treatment of neurosyphilis. Most investigators also believe that fever therapy should be avoided until penicillin has been proved deficient in a particular case, inasmuch as repeated courses of penicillin in higher amounts have been shown to be effective in a large proportion of both symptomatic and asymptomatic neurosyphilis patients who required additional treatment. An occasional late serious manifestation of neurosyphilis may require the added support of fever therapy, but the consensus of research observations at this time appears to favor penicillin as the initial course of therapy for most types of neurosyphilis. Long-term evaluative studies in this field should continue to provide definitive answers for all the ramifications of late syphilis.

Spinal Fluid Findings in Early Syphilis

Abnormal spinal fluid findings were found upon admission in about 7 percent of a large series of patients. These were usually slight deviations from normal in one or more of the test methods employed (Kolmer complement-fixation test, Eagle flocculation test, cell count, total protein determination, and colloidal gold reaction). None of the patients showed clinical evidence of central nervous system involvement. After penicillin therapy the spinal fluid became negative and remained negative in all those patients who continued under observation.

Among those patients whose pre-treatment spinal fluid findings were essentially negative, only two were observed later with neurorelapse. Both had secondary syphilis at the time of their original treatment with amorphous penicillin; one with 1,200,000 units and one with 2,400,000 units. In both cases we had observed indications of blood serologic relapse just prior to the clinical examinations which revealed the post-treatment positive spinal fluid findings. The first patient returned in the sixth post-treatment month with an acute meningeal type of relapse, and his spinal fluid examination showed the reactions to be: Kolmer 4444−, Eagle positive, colloidal gold 1112220000, cells RBC, globulin normal. After an intensified course of penicillin therapy, he gradually attained negativity in every respect. The second patient returned in the fourth post-treatment month and was re-treated with an intensified schedule for serorelapse and asymptomatic neurorelapse (Kolmer 442± − −, Eagle positive, colloidal gold 4311100000, other tests normal). He quickly attained and maintained negativity in all tests, in spite of a reinfection for which he was re-treated within the first year.

In the single-dosage schedules using procaine penicillin with aluminum monostearate, two patients were found to have positive spinal fluid tests after therapy. One patient with secondary syphilis treated with a single injection of 900,000 units returned at 448 days with definite laboratory evidence of neurorelapse in all tests, and positive blood test. No spinal fluid examination had been made at the time of original therapy, nor had interim serologic examinations been made. Hence the blood serologic pattern could not be established. The other patient had been treated for primary seropositive syphilis with a single injection of 300,000 units. With no interim examinations and no prior spinal fluid examinations, he was found at 513 days to have a positive blood test, and in the spinal fluid examination the Kolmer test was strongly positive, total protein 42 mg. percent, cell count normal, colloidal gold not done.

Among our total patients treated with penicillin for early syphilis, a good proportion have been followed for 3 to 4 years, or longer. Central nervous system involvement has not been observed in any of those patients who have

shown normal post-treatment progress toward clinical and serologic negativity. There seems to be little reason to expect such involvement after an acceptable schedule of penicillin therapy, since we have observed relatively few cases of neuro-recurrence, regardless of the type of penicillin therapy.

Serologic Observation

In judging the success or failure of therapy, the ideal serologic follow-up of patients consists of an examination every 2 weeks, or at least every month, for the first 6 to 12 post-treatment months. In the evaluation of an experimental therapy, a battery of qualitative serologic tests and a quantitative test, performed regularly, is advantageous for observation. However, in a public health program or in routine therapy utilizing a schedule known to be effective, essential information may be gained from the regular use of one qualitative and one quantitative test performed preferably with a cardiolipin-lecithin antigen.

Failure vs. Reinfection

Re-treatment rates reported herein include patients who fail to attain cure as well as those who acquire a subsequent syphilitic infection, for in evaluating the various penicillin schedules it has often been difficult to differentiate between relapse and reinfection. It is practically impossible to fulfill all the traditional criteria for reinfection in penicillin-treated patients, because the antibiotic eradicates the infection so quickly that the patient is susceptible to reinoculation within a matter of months, days, or even hours after the termination of therapy. With the exception of certain penicillin schedules which were inadequate as to individual dosage, time interval between injections, or duration of therapy, the true failure rate has been very low. We believe that 60 to 80 percent of our re-treated patients actually had new syphilitic infections, either symptomatic or asymptomatic.

This belief has been strengthened by the results of extensive epidemiological, clinical, and laboratory studies of all re-treated patients. These studies were aimed toward determining whether a patient with a true relapse will relapse a second time when re-treated with the same schedule of penicillin, or whether a favorable result following the administration of a second, identical course of therapy may indicate an asymptomatic reinfection. No report has been published, but the strong impression was gained from collected data that each reinfection can be cured by identical penicillin therapy; however, a true treatment failure will usually relapse again and again when re-treated with the identical schedule, but can be cured by an intensified one.

In patients with early infectious syphilis who have been successfully treated with penicillin, the serologic pattern may be expected to reverse to the negative state, usually within the first year. The rapidity of reversal is apparently dependent upon the stage and duration of the infection at the start of treatment and individual differences in immunological response. The unsuccessfully treated patient, when observation has been adequate, will usually show definite evidence of serologic relapse within 6 months following treatment; and clinical relapse may subsequently occur unless retreatment is instituted promptly.

A patient with a suspected serologic relapse should be carefully observed to be sure that the sustained rise in titer is attributable to syphilis rather than to some acute intercurrent infection. Once a diagnosis of serologic relapse has been confirmed, penicillin therapy should be administered at once; otherwise, serologic progress to negativity may be delayed for months or even years.

Reinfections

Theoretically, a perfect schedule of therapy should result in 100-percent cure of all cases of syphilis. In such a situation, all reappearances of syphilis in the treated group would be reinfections. If it is correct that immunity to syphilis is a function of systemic exposure to the spirochete in terms of time and numbers of spirochetes, then patients whose original diagnosis was seronegative primary syphilis would have very little immunity and therefore would be readily susceptible to reinfection. Patients with seropositive primary syphilis would have

Table 5. Comparison at 12 to 15 months of cumulative re-treatment rates for an adequate penicillin schedule and for an inadequate schedule

Schedule of therapy	Stage of syphilis	Total cases	Number observed 12 to 15 months	Cumulative percent			Total cases re-treated
				Re-treated on basis of serology only	Clinical relapse	Probable reinfection	
Single injection of 300,000 units procaine penicillin with aluminum monostearate.	Seronegative primary.	38	19	0	0	0	0
	Seropositive primary.	64	34	7.5	1.8	3.5	12.7
	Secondary	33	21	22.7	10.5	0	33.2
7,200,000 units of aqueous penicillin (200,000 units every 2 hours for 3 days).	Seronegative primary.	110	86	0	2.0	6.0	8.0
	Seropositive primary.	176	133	0	.6	2.6	3.1
	Secondary	89	62	1.5	1.1	1.4	4.0

some immunity and hence be less liable to reinfection. Patients with secondary syphilis would have developed considerable immunity and would be still less liable to reinfection. Following this line of reasoning, it can be expected that the better schedules of treatment would show a higher re-treatment rate in the primary stage than in the secondary. A comparison of these factors in two of our schedules lends force to the argument. In table 5 are shown the cumulative re-treatment rates by stage of disease for a very successful schedule of treatment (7,200,000 units of aqueous penicillin administered in doses of 200,000 units every 2 hours) and for an inadequate schedule of treatment (a single injection of 300,000 units of procaine penicillin with aluminum monostearate). In the former schedule, the cumulative failure rate decreases from primary to secondary; whereas in the latter schedule, it increases from primary to secondary.

Summary

1. Penicillin, as the sole therapeutic agent, can cure early syphilis.

2. Adequate concentration of penicillin must be maintained in the host for at least 3 days.

3. Definite evidence of serologic relapse will usually develop in the unsuccessfully treated patient within the first six post-treatment months, and clinical manifestations may develop if this relapse is not promptly re-treated.

4. A more intensified regimen than the original schedule is usually necessary for successful re-treatment of clinical and serologic relapse. Collected data indicates, however, that a reinfected patient may be cured by therapy identical to the original schedule, provided central nervous system involvement has not occurred.

5. Abnormal spinal fluid findings are observed in relatively few patients after an acceptable schedule of penicillin therapy for early syphilis. The clinician's suspicion of such involvement should be aroused by serologic relapse or resistance.

6. A single-dosage schedule of sparingly soluble penicillin in a satisfactory repository vehicle will eventually, in our opinion, be found to be therapeutically effective in early syphilis.

7. A successful schedule of penicillin therapy can be expected to show a higher cumulative re-treatment rate among early primary cases than among secondary cases; whereas an inadequate schedule of penicillin therapy will show a higher re-treatment rate among secondary cases than among primary cases.

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Leading Causes of Death

The tables and charts in this report present final 1949 mortality data on leading causes of death for the first time. Previous release of final death rates for 1949 was limited to a selected list of 32 causes of death.

Meaning of Rank Order

One of the more popular ways of presenting causes of death is by rank order. It is often useful to know the first seven or ten leading causes, or that a leading cause of a generation ago has now dropped to a minor position. Rank order often lends itself to dramatizing a particular disease: "Fifty years ago cancer ranked eighth among the causes of death; now it is second only to diseases of the heart."

Those who use rank order should be aware of its pitfalls and limitations as well as its dramatic qualities. Rank ordering answers some questions but not others. For example, it does not adequately answer, "What are the most important public health problems?" There are of course many communicable diseases, now far down the list but potentially explosive, that have a public health importance far beyond their present low rank order.

The question that ranking answers best is, "What are the most frequent causes of death?" Even to this

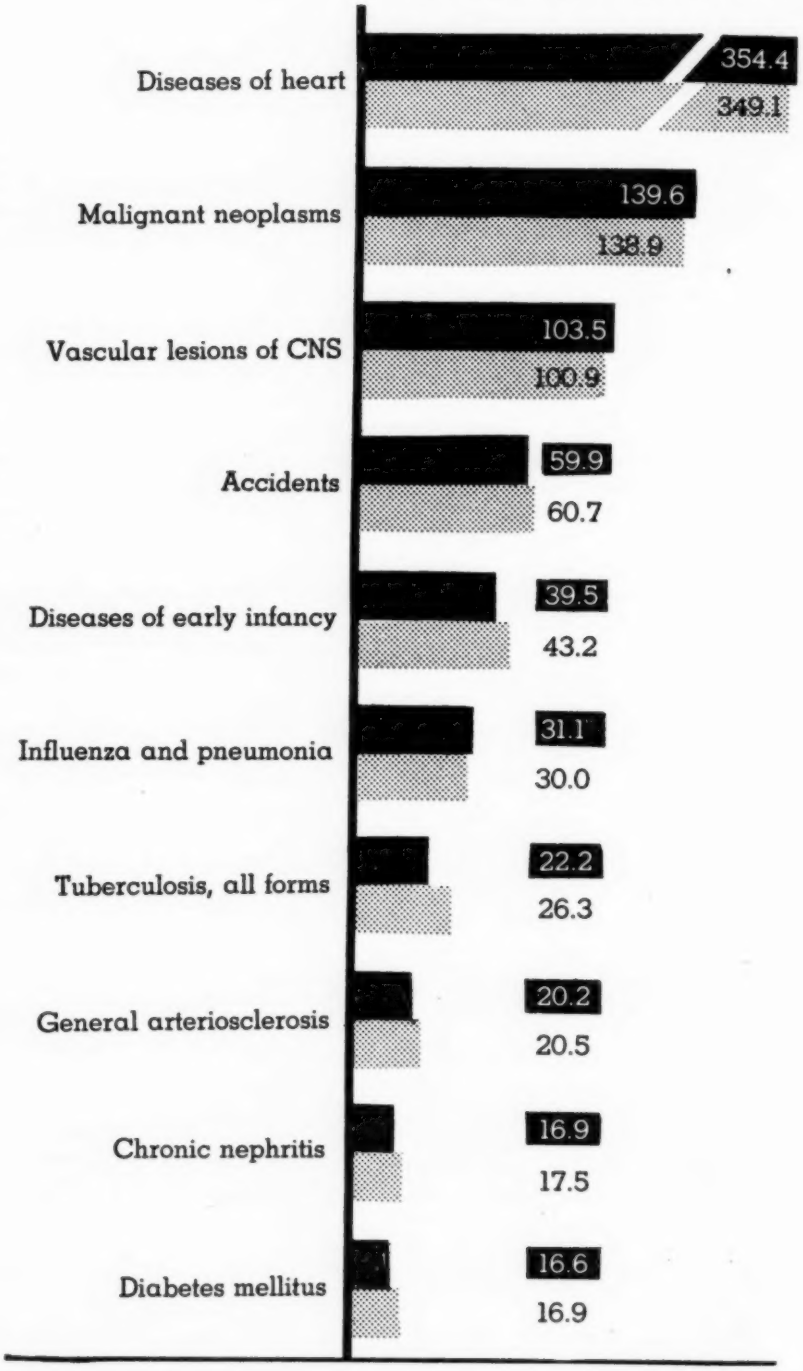
(*Continued on next page*)

The National Office of Vital Statistics of the Public Health Service has prepared this section.

DEATH RATES: United States - per 100,000 population

1949 ○ 1950

○ Estimated from a 10-percent sample of death certificates received in State vital statistics offices



White Male

Diseases of heart	426.4
Malignant neoplasms	146.0
Vascular lesions of CNS	97.6
Accidents	83.1
Diseases of early infancy	47.1
Influenza and pneumonia	30.8
Tuberculosis, all forms	28.6
General arteriosclerosis	21.8
Suicide	19.2
Chronic nephritis	17.0

White Female

Diseases of heart	283.5
Malignant neoplasms	140.2
Vascular lesions of CNS	100.0
Accidents	37.1
Diseases of early infancy	32.1
Influenza and pneumonia	23.0
Diabetes mellitus	21.2
General arteriosclerosis	20.9
Chronic nephritis	14.8
Tuberculosis, all forms	13.2

Nonwhite Male

Diseases of heart	327.6
Vascular lesions of CNS	113.4
Accidents	99.0
Malignant neoplasms	98.7
Tuberculosis, all forms	86.7
Diseases of early infancy	85.3
Influenza and pneumonia	64.0
Homicide	45.4
Chronic nephritis	31.6
Syphilis and sequelae	27.1

Nonwhite Female

Diseases of heart	273.6
Vascular lesions of CNS	122.6
Malignant neoplasms	105.3
Diseases of early infancy	62.9
Tuberculosis, all forms	58.8
Influenza and pneumonia	49.0
Accidents	35.2
Chronic nephritis	30.0
Diabetes mellitus	18.6
Hypertension (without mention of heart)	14.1

(from preceding page)

question the answers are not foolproof but depend on the specific list of causes of death from which the selection was made. At best, choice of a list is arbitrary, and it will often determine the rank of a particular cause—or whether it appears at all, since much depends on the way in which the various causes may be combined into broader categories.

Because of the interest in causes of death by rank and to promote uniformity in presentations of this kind, the Public Health Conference on Records and Statistics has recommended a rank-ordering procedure based on the Sixth Revision of the International Lists of Diseases and Causes of Death. This presentation is based on the "64-cause list" (table 1), designed for use in the National Office of Vital Statistics, with certain categories not ranked. These are indicated in the rank-order column of table 1 by ". . ."

Effect of Aging

Fifty years ago the leading causes of death in the United States were influenza and pneumonia, tuberculosis, and the group including gastritis, duodenitis, enteritis, and colitis. In 1949, influenza and pneumonia were in sixth place, tuberculosis in seventh place, and the diseases in the gastritis group had dropped to fifteenth place (table 1). These changes of course reflect, among other factors, the progress that has been made in the control of contagious disease in general, through such means as improved environmental sanitation and, more recently, the use of antibiotics.

Half the deaths in the United States are now caused by the cardiovascular diseases, of which the major component is diseases of the heart, accounting for more than a third of all deaths. Diseases of the heart are the leading cause of death for the population as a whole (see chart). The other principal components, vascular lesions of the central nervous system (chiefly cerebral hemorrhage) and general arteriosclerosis, rank third and eighth, respectively.

(See page 93)

Table 1. Deaths, death rates, and rank order for 64 selected causes of death, United States, 1949

[Deaths exclusive of fetal deaths and of deaths among armed forces overseas. Rates per 100,000 estimated midyear population excluding armed forces overseas. Numbers after causes of death are category numbers of the Sixth Revision of the International Lists, 1948.]

Rank	Cause of death		Number	Rate
	All causes		1,443,607	971.7
7	Tuberculosis, all forms	001–019	39,100	26.3
...	Tuberculosis of respiratory system	001–008	35,988	24.2
...	Tuberculosis, other forms	010–019	3,112	2.1
17	Syphilis and its sequelae	020–029	8,581	5.8
38	Typhoid fever	040	161	0.1
...	Cholera	043	0	
32	Dysentery, all forms	045–048	1,440	1.0
37	Scarlet fever and streptococcal sore throat	050, 051	486	0.3
36	Diphtheria	055	574	0.4
35	Whooping cough	056	727	0.5
34	Meningococcal infections	057	917	0.6
43	Plague	058	1	0.0
29	Acute poliomyelitis	080	2,720	1.8
42	Smallpox	084	2	0.0
33	Measles	085	949	0.6
40	Typhus and other rickettsial diseases	100–108	73	0.0
39	Malaria	110–117	118	0.1
24	All other infective and parasitic diseases	030–039, 041, 042, 044, 049, 052–054, 059–074, 081–083, 086–096, 120–138	3,930	2.6
2	Malignant neoplasms, including neoplasms of lymphatic and hematopoietic tissues	140–205	206,325	138.9
...	Malignant neoplasm of buccal cavity and pharynx	140–148	5,074	3.4
...	Malignant neoplasm of digestive organs and peritoneum	150–156A, 157–159	82,281	55.4
...	Malignant neoplasm of respiratory system	160–164	19,518	13.1
...	Malignant neoplasm of breast	170	18,553	12.5
...	Malignant neoplasm of genital organs	171–179	34,545	23.3
...	Malignant neoplasm of urinary organs	180, 181	9,859	6.6
...	Malignant neoplasm of other and unspecified sites	156B, 165, 190–199	21,065	14.2
...	Leukemia and aleukemia	204	8,102	5.5
...	Lymphosarcoma and other neoplasms of lymphatic and hematopoietic tissues	200–203, 205	7,328	4.9
22	Benign neoplasms and neoplasms of unspecified nature	210–239	5,861	3.9
10	Diabetes mellitus	260	25,089	16.9
23	Anemias	290–293	4,446	3.0
31	Meningitis, except meningococcal and tuberculous	340	2,147	1.4
...	Major cardiovascular-renal diseases	330–334, 400–468, 592–594	746,434	502.5
...	Diseases of cardiovascular system	330–334, 400–468	720,499	485.0
3	Vascular lesions affecting central nervous system	330–334	149,953	100.9
30	Rheumatic fever	400–402	2,304	1.6
1	Diseases of heart	410–443	518,568	349.1
...	Chronic rheumatic heart disease	410–416	20,434	13.8
...	Arteriosclerotic heart disease, including coronary disease	420	299,109	201.3
...	Nonrheumatic chronic endocarditis and other myocardial degeneration	421, 422	91,401	61.5
...	Other diseases of heart	430–434	23,816	16.0
...	Hypertension with heart disease	440–443	83,808	56.4
14	Hypertension without mention of heart	444–447	12,199	8.2
8	General arteriosclerosis	450	30,426	20.5
20	Other diseases of circulatory system	451–468	7,049	4.7
9	Chronic and unspecified nephritis and other renal sclerosis	592–594	25,935	17.5
6	Influenza and pneumonia, except pneumonia of newborn	480–493	44,640	30.0
...	Influenza	480–483	4,602	3.1
...	Pneumonia, except pneumonia of newborn	490–493	40,038	27.0
27	Bronchitis	500–502	3,284	2.2

Table 1. Deaths, death rates, and rank order for 64 selected causes of death, United States, 1949—Continued

Rank	Cause of death	Number	Rate
19	Ulcer of stomach and duodenum—540, 541	7, 809	5. 3
25	Appendicitis—550–553	3, 744	2. 5
16	Hernia and intestinal obstruction—560, 561, 570	9, 854	6. 6
15	Gastritis, duodenitis, enteritis, and colitis, except diarrhea of newborn—543, 571, 572	9, 970	6. 7
13	Cirrhosis of liver—581	13, 694	9. 2
26	Acute nephritis and nephritis with edema, including nephrosis—590, 591	3, 597	2. 4
21	Hyperplasia of prostate—610	6, 860	4. 6
28	Deliveries and complications of pregnancy, childbirth, and the puerperium—640–689	3, 216	2. 2
...	Abortion—650–652	394	0. 3
...	All other complications—640–649, 660–689	2, 822	1. 9
11	Congenital malformations—750–759	18, 864	12. 7
5	Certain diseases of early infancy—760–776	64, 179	43. 2
...	Birth injuries, postnatal asphyxia, and atelectasis—760–762	25, 553	17. 2
...	Infections of newborn—763–768	4, 471	3. 0
...	Other diseases peculiar to early infancy, and immaturity unqualified—769–776	34, 155	23. 0
...	Symptoms, senility, and ill-defined conditions—780–795	23, 520	15. 8
...	All other diseases—Residual	65, 147	43. 9
4	Accidents—E800–E962	90, 106	60. 7
...	Motor-vehicle accidents—E810–E835	31, 701	21. 3
...	All other accidents—E800–E802, E840–E962	58, 405	39. 3
12	Suicide—E963, E970–E979	16, 993	11. 4
18	Homicide—E964, E980–E985	8, 033	5. 4
41	Injury resulting from operations of war—E965, E990–E999	16	0. 0

(*Continued from page 91*)

For the most part, the leading causes of death have changed because fewer deaths from infectious diseases are occurring in the early and middle years. Consequently, a larger proportion of the population now survives to the older years in which cardiovascular diseases and cancer occur most frequently.

The chart also shows rank order and estimated death rates for the same 10 leading causes in 1950. A major change was in the tuberculosis death rate, which dropped 16 percent, for an estimated decrease of 5,470 deaths. According to estimates for the first 8 months of 1951, this decline has continued.

Death rates for influenza and pneumonia for 1950 and 1951 increased slightly over 1949, probably as a result of the influenza epidemic during the late winter and early spring months. Rates for diseases of the heart and malignant neoplasms also increased in 1951 over 1950, though probably by no more than would be expected with aging of the population.

The four sub-charts reveal significant differences in the leading causes of death for white and nonwhite males and females. For perspective in interpreting the figures, the totals for all causes may be helpful.

All causes, 1949

Group	*Deaths*	*Death rates per 1,000*
White male	726, 169	11. 0
White female	542, 679	8. 1
Nonwhite male	95, 122	12. 4
Nonwhite female	79, 637	9. 9

Death rates for tuberculosis and vasular lesions of the central nervous system are considerably higher for the nonwhite groups than for the white. The rates for malignant neoplasms appear to be considerably lower; at least part of this difference is probably due to inadequate diagnosis.

Syphilis and sequelae are among the ten leading causes of death only for nonwhite males. For all four groups the rank and death rate for this cause are as follows:

Syphilis and sequelae, 1949

Group	*Death rate per 100,000*	*Rank*
White male	6. 4	18
White female	2. 0	21
Nonwhite male	27. 1	10
Nonwhite female	11. 7	12

Diabetes mellitus is among the ten leading causes for females but not for males:

Diabetes mellitus, 1949

Group	*Death rate*	*Rank*
White male	13. 2	12
White female	21. 2	7
Nonwhite male	9. 3	16
Nonwhite female	18. 6	9

(*See page 94*)

Table 2. Leading causes of death, by age, United States, 1949

[Deaths exclusive of fetal deaths and of deaths among armed forces overseas. Rates per 100,000 estimated mid-year population in each specified group excluding armed forces overseas. For complete titles and category numbers of causes of death see table.1]

Rank	Cause of death and age	Number	Rate
	ALL AGES		
	All causes	1, 443, 607	971. 7
1	Diseases of heart	518, 568	349. 1
2	Malignant neoplasms	206, 325	138. 9
3	Vascular lesions of central nervous system	149, 953	100. 9
4	Accidents	90, 106	60. 7
5	Diseases of early infancy	64, 179	43. 2
6	Influenza and pneumonia	44, 640	30. 0
7	Tuberculosis, all forms	39, 100	26. 3
8	General arteriosclerosis	30, 426	20. 5
9	Chronic nephritis	25, 935	17. 5
10	Diabetes mellitus	25, 089	16. 9
	All other causes	249, 286	167. 8
	1-4 YEARS		
	All causes	18, 687	149. 1
1	Accidents	4, 739	37. 8
2	Influenza and pneumonia	2, 457	19. 6
3	Congenital malformations	1, 513	12. 1
4	Malignant neoplasms	1, 368	10. 9
5	Tuberculosis, all forms	831	6. 6
6	Gastritis, duodenitis, enteritis, and colitis	810	6. 5
7	Meningitis	414	3. 3
8	Other infective and parasitic diseases	364	2. 9
9	Measles	356	2. 8
10	Acute poliomyelitis	341	2. 7
	All other causes	5, 494	43. 8

(*Continued from page 93*)

Suicide is a leading cause of death only among white males and is rare for nonwhite females:

Suicide, 1949

Group	*Death rate*	*Rank*
White male	19. 2	9
White female	5. 5	16
Nonwhite male	7. 0	19
Nonwhite female	1. 5	29

The data indicate that nonwhite males run a far greater risk of homicides:

Homicide, 1949

Group	*Death rate*	*Rank*
White male	4. 1	21
White female	1. 4	28
Nonwhite male	45. 4	8
Nonwhite female	11. 3	15

In table 2 the causes of death are ranked for each age group. Among other things this table emphasizes a point frequently made by statisticians—that rank order of a cause of death should not be presented without the death rate, since even the most "important" causes of death in certain age groups are quite small in comparison with lesser causes in other age groups. Thus for the age group 5–14, the leading cause of death (accidents) is considerably less frequent than the 10th cause of death (tuberculosis) in the age group 65 years and over.

Infant Deaths

The age groups in table 2 exclude infants, because causes of infant deaths are quite different and must be drawn from a separate list. In the first 4 weeks of life, the neonatal period, the leading causes of death are immaturity, postnatal asphyxia and atelectasis, birth injuries, and congenital malformations, in the order named. Neonatal deaths account for about two-thirds of all infant deaths. The neonatal death rate in 1949, per 1,000 live births, is 21.4 compared to a total infant death rate of 31.3.

After the first 4 weeks, until the end of the first year, congenital malformations continue as one of the leading causes of death, while influenza and pneumonia become the leading cause. The gastritis group becomes increasingly important after the neonatal period. Accidents also first appear as a major cause of death after the first 4 weeks and hold a leading place throughout childhood, youth, and young adulthood. Although the death rates for influenza and pneumonia and accidents increase with advancing age, their rank decreases as the rates for other causes increase at a faster pace.

Table 2. Leading causes of death by age, United States, 1949 —Continued

Rank	Cause of death and age	Number	Rate
	5-14 YEARS		
	All causes	15, 717	63. 9
1	Accidents	5, 539	22. 5
2	Malignant neoplasms	1, 494	6. 1
3	Acute poliomyelitis	941	3. 8
4	Influenza and pneumonia	766	3. 1
5	Rheumatic fever	582	2. 4
6	Congenital malformations	572	2. 3
7	Diseases of heart	556	2. 3
8	Tuberculosis, all forms	471	1. 9
9	Appendicitis	359	1. 5
10	Other infective and parasitic diseases	282	1. 1
	All other causes	4, 155	16. 9
	15-24 YEARS		
	All causes	29, 483	132. 1
1	Accidents	11, 522	51. 6
2	Tuberculosis, all forms	3, 347	15. 0
3	Malignant neoplasms	1, 965	8. 8
4	Diseases of heart	1, 579	7. 1
5	Homicide	1, 482	6. 6
6	Suicide	1, 015	4. 5
7	Complications of pregnancy	939	4. 2
8	Influenza and pneumonia	722	3. 2
9	Chronic nephritis	607	2. 7
10	Acute poliomyelitis	585	2. 6
	All other causes	5, 720	25. 6
	25-44 YEARS		
	All causes	121, 704	276. 1
1	Diseases of heart	22, 902	52. 0
2	Accidents	19, 432	44. 1
3	Malignant neoplasms	18, 005	40. 8
4	Tuberculosis, all forms	12, 483	28. 3
5	Suicide	5, 257	11. 9
6	Vascular lesions of central nervous system	5, 105	11. 6
7	Homicide	4, 154	9. 4
8	Influenza and pneumonia	2, 969	6. 7
9	Chronic nephritis	2, 706	6. 1
10	Cirrhosis of liver	2, 489	5. 6
	All other causes	26, 202	59. 4
	45-64 YEARS		
	All causes	403, 604	1, 318. 0
1	Diseases of heart	158, 771	518. 5
2	Malignant neoplasms	81, 619	266. 5
3	Vascular lesions of central nervous system	37, 606	122. 8
4	Accidents	18, 302	59. 8
5	Tuberculosis, all forms	14, 237	46. 5
6	Diabetes mellitus	8, 410	27. 5
7	Influenza and pneumonia	8, 147	26. 6
8	Chronic nephritis	7, 342	24. 0
9	Suicide	7, 179	23. 4
10	Cirrhosis of liver	6, 978	22. 8
	All other causes	55, 013	179. 7
	65 YEARS AND OVER		
	All causes	741, 393	6, 578. 5
1	Diseases of heart	333, 992	2, 963. 5
2	Vascular lesions of central nervous system	106, 371	943. 8
3	Malignant neoplasms	101, 443	900. 1
4	General arteriosclerosis	28, 316	251. 3
5	Accidents	26, 651	236. 5
6	Influenza and pneumonia	20, 372	180. 8
7	Diabetes mellitus	14, 883	132. 1
8	Chronic nephritis	14, 835	131. 6
9	Hypertension without mention of heart	7, 873	69. 9
10	Tuberculosis, all forms	7, 420	65. 8
	All other causes	79, 237	703. 1

A topical and selective report of the seventy-ninth annual meeting of the American Public Health Association and related organizations, San Francisco, Calif., October 29–November 2, 1951.

The Practice of Public Health

PHR Conference Report

AGING

Public Health Has Chance To Enrich Added Years

Public health now has the opportunity to make worth while the years which have been added to life, Joseph W. Mountin, M. D., chief of the Bureau of State Services, Public Health Service, told the special general session on "Aging Challenges Public Health."

He pointed out that the goals of public health are to help older people remain productive members of society by preventing illness wherever possible, conserving mental and physical resources, and encouraging the maximum use of potential capacities. Despite an increasing interest in the problems of the aged, there is a certain reluctance on the part of professional workers to undertake any concrete programs, he felt.

Dr. Mountin called for a multidisciplined approach on a broad front. Already employers, labor organizations, educators, sociologists, administrators of welfare programs, and spiritual leaders are turning their attention to the problems of the aged. Public health must not only be an integral part of this nation-wide movement but must provide help and guidance in specific areas.

There are the health aspects of employment and retirement, Dr. Mountin noted, saying that more needs to be learned about work capacity and the physical and emotional status of the older worker. The health department, through the social and recreational clubs of older persons, has an opportunity to study the needs and desires of this group. He felt that health guidance and counseling clinics can provide general guidance in such areas as diet, exercise, rest, physical appraisal, early detection of impairments, accident prevention, mental and emotional problems, and employment counseling.

The public health nurse can play a very strategic role in a health program for the aging because of her close contact with the family. Engineers may find it desirable to develop new standards for housing, taking into consideration the safety, comfort, and health of older persons. Perhaps the outstanding opportunities for fruitful work with older people are in the field of health education, Dr. Mountin said.

In our February issue the second half of this report of the APHA meeting will cover international health, statistical methods, epidemiology, and environmental health.

Health educators, more than anyone else, will be aware of the fact that we are working with, as well as for, older people.

Dr. Mountin concluded that health promotion in the later years depends more on the encouragement of wholesome individual and community attitudes than it does on the provision of any specific services. "By putting what we now know into usable form and disseminating it widely," he said, "and by reorienting our thinking and our services, public health can make great inroads against prejudice and inertia and help promote the sense of dignity and usefulness that, together with good health, can lead to a more satisfying life in the older years."

We Live Longer Than We Work—Suggests "Phased" Retirement

Man's life expectancy is increasing faster than his working life. He now lives relatively longer than he works or, in other words, in life's later years the period of nonemployment or retirement is increasing.

These factors were brought to the special session by Clifford Kuh, M. D., director of public health, Permanente Hospital, Oakland, Calif.

The most valuable point of view, said Dr. Kuh, is that man's working life is a continual adjustment of the man to the job and the job to the man. Age, like any other handicap, is purely relative. Rather than discharge the older worker as unemployable, he should be transferred to another job in the organization. As ways of keeping the older worker on the job, Dr. Kuh suggested "phased" retirement, or reducing the number of work days a week with advancing years; matching the job and the worker through placement techniques of job analysis. In favor of employing the older person are his skills, experience, loyalty, dependability, and his record for less labor turnover, fewer absences, and fewer accidents.

Housing for the Elderly

Housing problems for older persons arise from their relatively low economic status—the fact that they are left in homes too large and unsuitable for their needs, in which they remain because of pride and independence, said Joseph W. Willard, director of the research division of the Department of National Health and Welfare of Canada, in

discussing housing and living arrangements for older people at the special section.

He suggested as possible solutions to the problem: well-supervised boarding homes; community housing designed for the aged; renovation of old residences into single-family housekeeping units; or an annex arrangement whereby the older members of the family could maintain a separate home, yet still be close to their children.

Mortality Records of 16 Countries Superior to U. S.

Although no other country has consistently lower death rates than the United States, 16 countries have as good or better mortality records for the older age group (see chart), Louis I. Dublin, Ph. D., second vice president and statistician of the Metropolitan Life Insurance Company, reported to the statistical section. Dr. Dublin stated that the United States ranks among the best countries in the world with regard to longevity, yet this index of our leadership obscures some items in our health picture in which we fall behind other countries.

The United States has a distinct advantage in low mortality in childhood and early adult ages because of the gains which have been made in the control of infectious and communicable diseases. On the other hand, he pointed out, improvement in mortality rates toward the end of midlife has been relatively small, and in old age it has been almost imperceptible.

"Eating to Death"

Dr. Dublin places upon our way of life the blame for our reversal from a country of low mortality before midlife to one of comparatively high mortality thereafter, and upon the fact that as a Nation we have been blessed with an abundance and a variety of food with ample means to indulge our appetites. At least one-fifth of our adults are more or less seriously overweight. "A large number of our people are literally eating themselves to death," Dr. Dublin said. Insurance studies have shown that overweight in midlife is associated with higher than

APHA Conference Report

More than 4,000 professional workers in the ever-widening field of public health gathered in San Francisco to attend the seventy-ninth annual meeting of the American Public Health Association, the eighteenth annual meeting of the western branch of the association, and meetings of related organizations.

Delegates came from every State and Territory and from many foreign lands. They heard, and in many cases participated in, presentations by some 475 of their colleagues. But no one person attending the meetings could possibly take part in more than a very few sessions, no matter how far-ranging his interests. Yet, without doubt, those at the conference as well as those who remained at home want to be informed—as promptly as possible—of at least the main trends of discussions.

It was with these needs in mind that, through the cooperation of Dr. Reginald M. Atwater, executive secretary of the association, *Public Health Reports* undertook to provide a reporting service of the technical highlights of the entire 1950 meeting. These results were apparently generally satisfactory, and the Executive Board of the American Public Health Association urged that the practice be continued.

This is a news-type reporting of the highlights of many of the sessions. We have attempted to give the essence of the presentations, but by no means the complete story in each case. We have endeavored to reflect accurately the intent of each speaker although we have had to take somewhat extensive editorial liberties in the interest of brevity. The source of each report is stated and it must be clear that the author—not the Public Health Service—is the authority in each instance.

Our primary sources have been the advance abstracts, press releases, and texts available through the pressroom facilities of the association in San Francisco. This accounts for much of the selective character of the report. Material which was not available in some script form obviously could not be included. Reporting of informal panel-type discussions is, in consequence, incomplete.

We have dealt only with the scientific sessions of the meetings. Association business has not been reported, this being a function of the official journal. And no full papers, of course, are published. Complete texts of the leading papers have already begun to appear in the *American Journal of Public Health*, and others will appear in appropriate specialty journals.

The appreciation of the editors is extended to the many authors who provided us with texts and summaries of papers, and to the members of the Public Health Service staff who helped in collecting material.

average mortality, particularly from cardiovascular-renal diseases and diabetes.

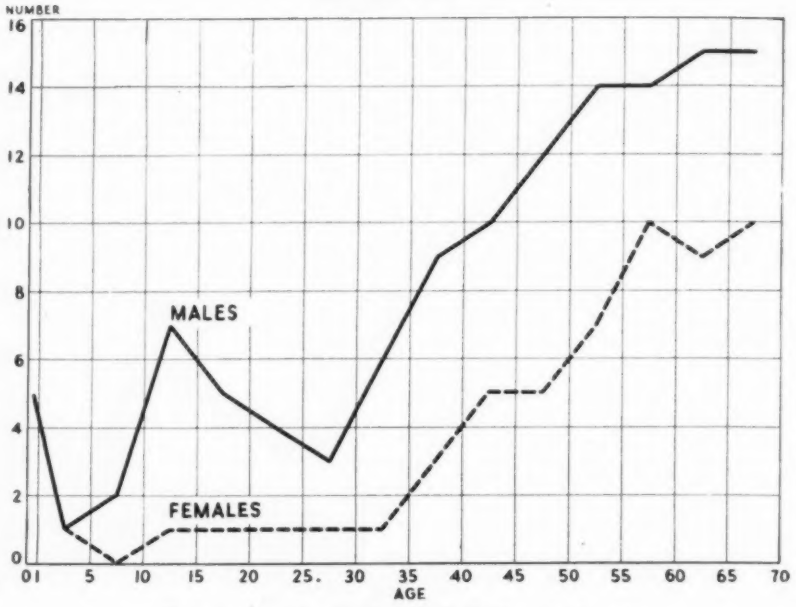
Health Officer as Leader

Further, Dr. Dublin suggests that the high level of medical care in the United States has been prolonging the lives of persons impaired by earlier infections, who, in other countries, would die at an early age. Only a careful survey of the prevalence of such impairments in all countries can determine the validity of this assumption.

The situation of the increasing proportion of older persons in the population presents an inviting opportunity for the health officer to raise the level of health in his community, concluded Dr. Dublin. He can assume more leadership in accident prevention, in the early detection of degenerative diseases, and in health education programs in nutrition and in habits of personal hygiene.

ADMINISTRATION

Number of Countries With Age-Specific Death Rates Lower Than United States



Postwar experience of a total of 17 countries of western Europe and English-speaking countries elsewhere

—Chart from Metropolitan Life Insurance Co.

Health Aims Are Citizen Responsibilities Also

The American Public Health Association evaluation schedules for appraising local health services are a valuable technical tool for health personnel in program supervision and control, but they are too complex to be appropriate for general publication, the health officers' section was told by V. A. Van Volkenburgh, M. D., assistant commissioner of the New York State Department of Health.

Evaluation data are a fundamental necessity in any health department program, said Dr. Van Volkenburgh, but wherever possible citizens should be led to discover for themselves the health needs of their communities and how these needs may be best satisfied. The desired goal for community health projects is citizen responsibility, not health department responsibility alone, he continued.

Dr. Van Volkenburgh said that a simple nontechnical form of health survey should be utilized for reporting results to the general public. He felt that surveys requested and participated in by citizens' groups, with the technical aid of the health department, are usually most meaningful to the public.

Central Service Agencies

The growing need for the services of the nonmedical administrator in public health organizations was discussed by two panels conducted by the Association of Business Management in Public Health. One panel dealt with the topic, "Is public health unnecessarily restricted by central service agencies?"

Moderator of the panel was Robert G. Webster, chief of the division of administration of the California State Department of Public Health. Other discussants were Pierce H. Fazel, chief administrative analyst with the California State Department of Finance; H. Neil Graham, public health representative, Federal Security Agency Region X; James C. Malcolm, M. D., health officer of Alameda County, Calif.; Henry C. Schumacher, M. D., consultant in mental health activities, Federal Security Agency Region X; and Clifford C. Shoro, director of the office of business administration, New York State Department of Health.

The discussion developed the point that many central service agencies are inclined to dictate aspects of programs in some situations. The panel appeared to accept the view that the central service agencies should determine what a program would cost, should handle the budgetary presentation and operation, and should provide consultation on any potential fiscal or administrative problems.

The program director has the basic responsibility for the program and thus must be prepared to explain what has been done and what is proposed, the discussion developed. He should be able to prescribe, realistically and reasonably, the tools which he requires for his work.

Skilled Administrators

The second panel was a sequel to the discussion, held in St. Louis in 1950, of the role of nonmedical administrators. Moderator Murray R. Nathan, assistant director of the office of medical defense of the New York State Department of Health, as a basis for the discussion, outlined the widespread belief that there are many important duties in large public health agencies which persons trained in administration, but without medical training, can effectively perform.

The panel consisted of J. B. Askew, M. D., health officer of the city and county of San Diego, Calif.; Carl E. Buck, Dr. P. H., professor of public health practice at the University of Michigan School of Public Health; Gordon R. Cumming, chief of the bureau of hospitals, California State Department of Public Health; Evelyn Flook, chief of the program evaluation and records section of the Division of State Grants, Public Health Service; and Hollis S. Ingraham, M. D., deputy commissioner of the New York State Department of Health.

Many public health organizations have developed to such a size that if all administrative duties fall upon the medical director he is unable to direct the basic program as he should. While there is a lack of administratively trained personnel, the management job continues to grow as a responsibility and requires a separate person of status.

While the need for an administrator has been present in many departments for a long time, the need has not been interpreted nor understood by many health officers, the panel felt, and it often is only under the burden of voluminous paper work that the need becomes apparent.

Community Health Councils

One of the increasing points of emphasis in 1951—in health as well as in other fields—is the recognition of the importance of the community as a whole with its family and individual units, Ira V. Hiscock, Sc. D., M. P. H., chairman of the Yale Department of Public Health, remarked before the National Conference for Health Council Work.

Reviewing the recent growth and present place of health councils, Dr. Hiscock pointed out that "in occupying a place of central responsibility in the planning process, a council needs to be representative of community forces and to insure that so-called operating agencies share responsibility to participate in the community organization, the study, and the planning process."

The extent of this participation may be influenced by the politics, program, budget, and functioning of given agencies, as well as limited by the kind and quality of staff available, Dr. Hiscock noted. The broadened horizons and increased flexibility of approach to joint studies of cooperative programs among some national agencies, he said, especially as they relate to local partnership projects in central planning and coordination, are favorable symptoms.

"In turn," the Yale professor said, "commendable trends are noticeable in some fund raising quarters to recognize the fact that more than dropping money in a slot is necessary to produce constructive research and to apply and interpret the benefits of scientific knowledge."

Professional Education

"A comprehensive professional education and training program is one of the basic objectives of any cancer control program," asserted Paul R. Gerhardt, M. D., director of the bureau of cancer control, New York State Department of Health, in speaking before the Public Health Cancer Association.

Dr. Gerhardt described the extensive and comprehensive professional education and training program for cancer being carried out in New York. The activities include all professional groups and consist of distribution of literature, periodicals, and professional movies, and the provision of lectures, teaching days, tumor clinic consultants, refresher courses, and postgraduate training. The program is in cooperation with the State medical society and cancer association.

The physician is "the one individual upon whose shoulders perhaps rests the greatest responsibility," Dr. Gerhardt pointed out. "On his efforts to recognize precancerous lesions, to suspect and diagnose cancer early, to render adequate treatment, and to secure competent consultation depends frequently the life or death of the individual."

Manpower Needs in England

With expanded manpower needs of Great Britain's National Health Service, considerably more health workers are needed, and this, combined with a shortage of young people, requires drastic steps, J. Greenwood Wilson, M. D., school medical officer and medical officer of health, city and port of Cardiff, Wales, told the health officers' section.

The British medical officer of health advocated the following steps: training the individual worker for multiple jobs—such as combining the jobs of the public health nurse, the midwife, the health educator, and the social worker; removing the public health nurse from clinics and providing domestic help to assist those with chronic and acute illnesses at home; emphasizing child health; making sure sanitarians are being utilized wisely; training physicians to enable them to give spot care in civil defense; and training the population in first aid techniques to relieve professional manpower.

REHABILITATION

Time Lag Must Be Cut, Knowledge Put To Work

With a tide of chronic disability threatening to engulf us medically, socially, and economically, we must reduce the time lag between our available knowledge of the problem and its application to those whom it would benefit, Mary E. Switzer, director of the Federal Security Agency's Office of Vocational Reha-

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bilitation, stated before the industrial hygiene, medical care, and public health nursing sections.

Miss Switzer pointed out that statistics of the Liberty Mutual Insurance Company's rehabilitation center in Boston show the average time between injury and referral to the center to be 6.4 months. A study of the Federal-State program shows that in 4,400 cases the time lag between injury and referral averaged 7 years. This is a serious waste for the individual, the employer, and the country as a whole, she said.

Much depends on placement procedures, she added, citing a survey by the Public Health Service which showed that coordinated hiring practices between medical, safety, and personnel departments produced much lower rejection rates for physical impairment than when rigid standards were adhered to on a mass basis.

Disabled Men Work Again

Gains in human values and in dollars far exceed the cost of providing rehabilitation services, Stanwood L. Hanson, assistant vice president of the Liberty Mutual Insurance Company, emphasized in reporting his company's interest and work in this field.

The insurance company became interested in rehabilitation as a matter of sound business principles, said Mr. Hanson. Research into the problems of reducing length and severity of accident disablement revealed errors in diagnosis and in psychological handling of individuals. These research efforts culminated in the establishment of a rehabilitation center in Boston in 1943 and one in Chicago in 1951.

Over 2,000 persons have been treated at the Boston center, Mr. Hanson said. Approximately two-thirds of them have returned to productive employment. Some 200 major amputees are wearing artificial limbs successfuly; three-fourths have been restored to jobs.

Service at the Boston center includes physical, occupational, and recreational therapy, and possible needs for vocational re-education or appropriate employment are also considered, he said. Placement problems are handled by rehabilitation nurses, trained to counsel seriously injured workers in coordinating their entire process of rehabilitation.

The rehabilitation work is carried on without cost to the injured worker, continued Mr. Hanson. He said the average cost of the 400 cases during the past year was $480 a case and that his firm feels this to be a profitable investment.

Problem Follow-Up

Full employment cannot be a realistic rehabilitation goal for every disabled person, Bernard D. Daitz, M. S. P. H., special assistant for tuberculosis rehabilitation of the Veterans Administration, emphasized to the rehabilitation workshop session of the medical care section. Sheltered or home-bound employment, or mere capacity for self-care, may be the most practical goals in the rehabilitation of some disabled persons, said Mr. Daitz.

Attempted rehabilitation of any person is impractical, he continued, unless a thorough follow-up and evaluation process is also conducted. These are inseparable in the rehabilitation process, for without follow-up, evaluation is impossible and without evaluation, follow-up is meaningless, he said. The mere healing of an amputee's stump or the arresting of a disease is not enough, he pointed out. If the amputee discards his prosthetic device because it is useless in his work, or if the tuberculosis patient becomes only a health department case entry, rehabilitation work has been in vain.

Statistically complete case histories adequately reflecting services required by the patient, the services actually supplied him, and the end results achieved, are of vital importance to the rehabilitation process, Mr. Daitz stated. Only the routine production and review of such records will enable the rehabilitation worker to assess the results of his work and to develop his field to a level of professional maturity, he concluded.

Case Services

A unified, cooperative team of medical specialists and education and vocational training specialists is required to rehabilitate the handicapped person, the rehabilitation workshop of the medical care section was told by Sydney S. Norwick, M. D., M. P. H., regional medical consultant of the Federal Security Agency's Office of Vocational Rehabilitation in San Francisco.

Such a team is needed in rehabilitation, said Dr. Norwick, because the family doctor can no longer keep abreast of all new medical developments, nor can he maintain detailed knowledge of his patient's family and psychological needs, or of all the vocational possibilities in the community. To evaluate properly the total potentialities of the handicapped person, he continued, it is necessary to utilize information from multiple sources, such as nurses, physical and occupational therapists, laboratory and X-ray examinations, and results of skilled interviews and evaluations of personal, psychological, and social attitudes and situations.

This evaluation must consider the attitude of the family and of the community toward the individual as well as his feelings about them, Dr. Norwick said. He added that rehabilitation is incomplete unless the individual is made to feel that he has some means of regaining status in the minds of his family and his community. Economic and social factors are also important, he said.

Dr. Norwick emphasized that physicians must not only evaluate medically the patient's condition but also interpret to the patient, his family, and other members of the rehabilitation team precisely how his disability handicaps him or is likely to handicap him in the future. The physician must also share in the detailed planning for physical restoration services, including the provision for all necessary convalescence and follow-up services such as prosthetic appliances and the training of the tic appliances and the training of the individual in the use of them, he added.

OCCUPATIONAL HEALTH

Health Service Needed In Small Plants

The health professions, labor, and management are confronted by the basic job of promoting the establishment of health programs in small plants when they are inadequate or nonexistent, Seward E. Miller, M. D., chief of the Public Health Service's Division of Occupational Health, told the industrial hygiene and medical care sections.

Dr. Miller emphasized, also, that helping the worker to achieve maximum health and productivity—through rehabilitation, programs in human relations, or provision of general diagnostic and preventive services—calls for the combined efforts of the health and related professions. "It is not enough," he said, "to tell the employee that he should see a doctor; instead, every opportunity must be sought to make the plant medical department a vehicle by means of which the worker and the community's public and private health resources are brought together."

Emphasize Optimum Health

Industrial medicine offers the opportunity to emphasize the attainment of optimum health rather than the curing of established illness, Dr. Miller continued.

Industry realizes that mental and social as well as physical factors must be considered if maximum health and productivity are to be achieved. The fact that at least one-third of all sickness absenteeism in industry is caused by emotional disturbances is causing concern to both management and labor, Dr. Miller reported. For these reasons, industry is showing promise of taking the lead in prevention and relief of occupational factors associated with mental, emotional, and related disorders among its workers.

Rehabilitation of persons kept out of the labor market by injury or illness and guidance as to sources of assistance are other areas in which the physician is alining himself with the social scientist.

Cooperation between health and allied agencies is necessary to insure that the worker carries out the recommendations made after preplacement and periodic examinations. Referral and follow-up procedures need to be strengthened, he said, and the services offered by prepaid medical care and hospitalization plans should be expanded.

In 1975, the number of workers over 45 years of age is expected to be twice the 18-percent figure of 1900, Dr. Miller pointed out, saying that even though these workers remain healthy and efficient, fatigue and a certain amount of chronic disease will necessitate maintaining careful checks on their health.

Principles of Service

Herbert K. Abrams, M. D., chief of the bureau of adult health, California State Department of Public Health, told the industrial hygiene section that the work of a governmental industrial hygiene agency includes more complex activities than the control of occupational diseases. "Investigation of occupational health hazards, measures for their prevention, promotion of good health services in plants—these are the cardinal elements of the program," he said. "But in the background of all of these and directly bearing on the success or failure of the program are the more complex social and economic factors; for example: attitudes of labor and management to health measures, . . . to each other, and to the governmental agency."

Five basic principles must be observed by governmental units, according to Dr. Abrams: (1) the primary responsibility to safeguard the health of workers; (2) unbiased technical work and policies; (3) authority in speaking on health hazards and the adequacies of measures for protecting employee health; (4) intelligent interpretation of the program to labor, management, and the health professions; and, as the major objective (5) to conduct studies to improve the previous methods used by the plant as well as those used by the agency.

MEDICAL CARE

No Magic In Fee System, But Service Must Result

"No method of payment possesses the magic power of producing high quality of service," Franz Goldmann, M. D., associate professor of medical care of the Harvard University School of Public Health, maintained before the medical care section after reviewing the problems and methods of payment to physicians in medical group practice.

Missionaries by far outnumber mercenaries among group-care physicians, Dr. Goldman pointed out, but payment to physicians must encourage adequate service in health and sickness, he emphasized.

The physician expects compensation which recognizes the long period required for his education, the experience and skill acquired after graduation, and the value of his service to individuals and to the community. The agency administering group funds wants quantitatively and qualitatively adequate service at the least cost consistent with high standards, he said.

Mine Workers Fund

In the discussion following Dr. Goldmann's remarks, Dr. John Newdorp, assistant to the executive medical officer of the United Mine Workers of America Welfare and Retirement Fund, described the policy and experience of that organization. The fund has about 2,000,000 beneficiaries, and care is provided on a fee-for-service basis. The decision to use fee-for-service was based on the large numbers of persons involved, the preference of physicians for this method of payment, and the urgency in getting started, Dr. Newdorp reported. No formal agreement is made with physicians and no fee schedule has been adopted. This method of payment provides geographic and qualitative flexibility and precludes bargaining. Bills which appear to be unreasonable are reviewed by the area medical officer.

Crippled Children's Program

Dr. Marcia Hays, chief of the bureau of crippled children's services, California State Department of Public Health, stated that the fee-for-service method of payment was the only feasible one for a service such as that provided under the crippled children's program. A great deal of work is entailed in maintaining fee schedules. Fees are negotiated with specialty groups. These negotiations are facilitated by the fact that beneficiaries are children. Some flexibility is allowed for exceptional cases. The careful maintenance of the fee schedule helps to reduce administration to a minimum, she reported.

California Physicians' Service

Dr. Albert E. Larson, medical director of the California Physicians' Service, described payments made by that organization, which is served by some 11,000 physicians. Fee schedules are developed by consultation with physicians and are reviewed every 2 years. A questionnaire concerning fees was sent to every physician in California, and an average fee schedule is being established. The organization does not wish to set payment levels to those characteristic of the low-income group, Larson said. Subscribers get about 50,000 services a month in office, home, and hospital. Bills are submitted by code. The administrative cost is about 3½ percent. Bills are reviewed by the medical policy committee of the board of trustees' local medical review committees.

Vocational Rehabilitation

Dr. Thomas B. McKneely, chief medical officer of the Office of Vocational Rehabilitation, Federal Security Agency, described its policies for payment for physician services. State plans must provide schedules of fees as part of the procedure for satisfying Federal requirements for approval, and full payment is made for medical services. Rates must not be in excess of those paid by other agencies.

Professional advisory committees are used in devising fee schedules. Fee-for-service payments have been adopted because of the nature of the program, Dr. McKneely reported.

Health Insurance Plan

Dr. Edwin F. Daily, deputy medical director of the Health Insurance Plan of Greater New York, indicated that the plan now has an enrollment of some 250,000 beneficiaries, with an average premium payment of $23.33 per year.

More than $7,000,000 a year is paid by the plan for medical services—almost equal to the amount paid by Blue Shield for 10 times the number of subscribers. Dr. Daily attributed the difference to the fact that HIP provides a comprehensive medical service whereas the Blue Shield program has many restrictions.

Payments to medical groups are made on a per capita basis, and the group determines the distribution of its income among capital expenses, administrative costs, and payments to physicians. Methods of payment to physicians are determined by each individual group, he said.

Permanente Hospital and VA

Dr. J. P. FitzGibbon, medical director, Permanente Hospital, Oakland, Calif., indicated that the fee-for-service method of payment did not work and that the salary type of payment is now in effect. Dr. James C. Harding, assistant chief medical director for out-patient service, Veterans Administration, indicated that at the 132 Veterans Administration hospitals and 110 out-patient clinics physicians are paid on a salary basis. In the home town service of the Veterans Administration, payments are made on a fee-for-service basis using a fee schedule devised by the Veterans Administration. In addition, clinical consultants to the Veterans hospitals are paid at a daily rate.

Puget Sound Cooperative

Dr. Erwin S. Neiman, director of preventive medicine, Group Health Cooperative of Puget Sound, Seattle, stated that physicians in the group are paid a full-time salary. Home, office, and hospital care is provided. There are no extra charges. Some 30,000 beneficiaries are served by a group of 27 physicians. Administrative costs are low. Variations in salary are based on differences in degree of responsibility carried, Dr. Neiman said. The medical staff policies, the quality of service rendered, and staff meetings are valuable in maintaining standards. He pointed out that some system of reward for meritorious service would be desirable. Bonuses are now distributed equitably among the medical staff.

More Under-Utilization Than Abuse of Prepaid Service

From the viewpoint of preventive medicine, there is under-utilization rather than abuse of service in prepaid medical plans, S. J. Axelrod, M. D., associate professor of the University of Michigan School of Public Health, and Robert E. Patton, M. P. H., biostatistician of the New York State Department of Health, reported to the medical care section. Their study of the Windsor Medical Services of Canada revealed that 39 percent of the subscribers saw no physician during the 12-month study period. Other findings were:

Only 1,500 of more than 100,000 subscribers chose the limited surgical rather than the comprehensive physicians' service contract. This preference is striking in view of the negligible interest in comprehensive coverage attributed to Blue Shield members, Axelrod and Patton felt.

Of subscribers who saw physicians, 36 percent saw one, 15 percent saw two, and 10 percent saw three or more physicians. Only 1 percent saw four or more practitioners.

There were only 42 night calls per 1,000 subscribers during the study year, although no extra charge is

made for such calls. Windsor Medical Services has waiting periods for preexisting conditions, but the study did not show that this was necessary, the authors said. The 21 percent of subscribers who joined during the study year accounted for 9 percent of the total participant months.

California's Disability Payments Total $97 Million

Between December 1946 and the end of June 1951, California paid 97 million dollars in disability insurance, and since January 1950, 4 million dollars has been paid for hospital benefits, Herbert M. Wilson, chief of the division of disability and hospital benefits of the California Department of Employment, reported to the industrial hygiene and medical care sections.

California was the second State to incorporate a disability insurance program in its unemployment insurance for victims of nonoccupational illnesses and injuries, and has added hospital benefits since January 1, 1950. The California law permits "contracting out" under private plans offered by insurance carriers. Employees pay all costs of disability insurance and hospital benefits through a 1-percent tax on their wages. The program is administered by a lay staff of claims examiners reinforced by a medical director and staff, he said.

1950 Social Security Changes Affect Care of Needy

That "health and welfare are—or should be—in business together," is the thesis of the draft statement on tax-supported medical care for the needy, jointly prepared by the American Public Health Association and the American Public Welfare Association, Lucille M. Smith, public health administrator of the Division of Public Health Methods, Public Health Service, told the medical care section.

The joint statement provides facts needed to enable both health and welfare agencies to discharge the responsibility for which they each have special competence, she said. The most timely, she felt, was the review of provisions of the 1950 amendments to the Social Security Act that directly affect medical care for needy persons, and the discussion of how Federal funds for medical service for recipients of assistance can be used.

The joint committee agreed, Mrs. Smith pointed out, "At this time no single pattern of responsibility for medical care to needy persons is either possible or desirable. . . . Whatever the pattern of administrative responsibility, cooperation between health and welfare departments is essential to effective use of public resources. Through joint planning, duplication and waste can be avoided, gaps in service can be filled, and the future development of programs can be placed on a sound basis."

Antibiotics, Not Surgery, Cutting Appendicitis Toll

"Looking backward from today's vantage point, it seems unlikely that surgery alone contributed much to the reduction of appendicitis mortality," Paul A. Lembcke, M. D., associate professor of public health administration of the Johns Hopkins University School of Hygiene and Public Health, told the medical care section.

"Substantial reduction in appendicitis mortality appears to be attributable almost entirely to treatment with the sulfonamides and other antibiotics," and "whether surgery is needed in addition to antibiotic treatment is still an open question," he said.

Dr. Lembcke expressed these views in connection with a study of appendectomy rates as a segment in a study of the quality of medical service. "The true measure of quality must be based not on how well or how frequently a medical service is given, but on how closely the result approaches the fundamental medical objectives of prolonging life, relieving distress, and restoring function," he maintained.

The study covered 860,000 persons in 7,400 square miles of western New York served by 33 general and 14 special hospitals. Combined crude primary and secondary rates for appendectomies in 1948 were 5.43 per 1,000 population, or about one-third of the average birth rate for the past 20 years. This would suggest that one-third of the population would have appendectomies sometime during their lives, he reported.

FLUORIDATION

Dental Caries Reduced by Fluoridation

Dental caries in children can be reduced 60 to 70 percent by the use of fluorine-treated water, Dr. Hollis Ingraham, M. D., deputy commissioner of health of New York, reported to a joint session on fluoridation of the dental health, engineering, and health officers sections, delivering the paper of his chief, Dr. Herman Hilleboe. Results of a 4-year study in Newburgh, N. Y., where the effectiveness of fluorine-treated water on tooth decay was tested, showed that the number of lost first molars decreased by 60 percent and untreated, decayed first molars decreased by 68 percent.

Dr. Ingraham predicted that if this trend continues, a point may be reached where, with the present complement of practicing dentists, such caries as may occur can be treated, and tooth mortality and untreated caries may be reduced to a negligible level.

Dr. Ingraham also commented on the low cost of fluoridation, stating that estimates indicate a cost to each person of only 5 to 15 cents per year. He estimated that if a person lives to be 70 years old, he may expect a reduction of 67 percent in tooth decay, for a total cost of $2.10.

Dentists Have Four Duties

The dentist's responsibilities in the fluoridation of public water supplies are fourfold, according to Robert A. Downs, D. D. S., chief, public health dentistry section, Colorado State Department of Public Health.

Since it is obvious that the solution of the dental caries problem is hopeless if it is attacked from the

angle of restorative dentistry alone, the first and direct responsibility of the dentist is to promote fluoridation. Second, he will also be called upon to provide factual information on cost, methods, possible harm, and results.

Because of the widespread publicity given to fluoridation programs, many communities agitate for fluoridation without knowing whether or not their water supply contains the recommended concentration of fluoride. The third responsibility of the dentist, therefore, is to establish a baseline and have chemical analyses made of the water supply to determine whether fluoridation is necessary. Finally, Dr. Downs pointed out, the dentist has the responsibility for evaluating the effects of the program, after a sufficient period of time has elapsed.

Engineers Are Key Men

The success of fluoridation installations will depend primarily on the efforts of engineers, said Franz J. Maier, senior sanitary engineer of the Division of Dental Public Health, Public Health Service. It is the engineer's responsibility to determine how much fluoride should be added and which compound should be used. He must also determine which type of feeder to use and how the fluorides should be applied. The protection of the operators and the control of the fluoride concentration are also problems that must be solved.

Mr. Maier pointed out that a fluoride concentration of 1.0 ppm is optimum, though it will vary in some parts of the country. At present three preferred compounds are used: sodium fluoride, sodium silicofluoride, and hydrofluosilicic acid. Choice of the compound will depend upon the size of the treatment plant, storage space, and the type of feeder equipment used. Protective devices and careful handling will eliminate hazards to operators. Mr. Maier concluded that a periodic fluoride determination of representative water samples is necessary to maintain a constant check of the accuracy of the fluoride concentration.

Wisconsin Experience

To date a total of 63 communities with a population of 657,044 are fluoridating their water supplies, reported O. J. Muegge, State sanitary engineer, Wisconsin State Board of Health, in describing the Wisconsin experience in applying fluoride to water. Twelve water supplies have an adequate fluoride content. When pending installations, including that of Milwaukee, are placed in operation, 69 percent of the population of the State served by water systems will have fluoridated water.

Mr. Muegge noted that the Wisconsin experience with controlled fluoridation of communal water supplies has been most favorable. Dental surveys have shown that caries control is comparable to that of communities with natural fluorides. Personnel in even small communities are capable of operating equipment and performing control determinations. Problems of incrustation and corrosion can be met and hazards to operators minimized.

HOME ACCIDENTS

"Immunize" Children With Protection and Education

If protection is regarded as passive immunization and education as the active component, it can be shown that, with proper boosters, children can be immunized against serious accidents, Harry F. Dietrich, M. D., of the Beverly Hills Clinic told a session of the subcommittee on accident prevention of the committee on administrative practice.

Parents and all others concerned with child care must be acquainted with a practical theory of accident prevention. "The time spent on manners and mummery, cleanliness and curls, and bowels and bladder might better be spent on education in safe behavior," Dr. Dietrich maintained. "It is not that I object to pretty, clean children, well mannered in eating, eliminating, and entertaining—it is only that I do not like to see them dead of accidents."

Protective and educational measures must be reciprocally related and varied according to the child's age, he said. During the first year of life, 100-percent protection must be provided; by 5 years of age principal reliance must be placed on what the child has experienced and has been taught, Dr. Dietrich felt.

Rally Public Support

Safety has not been built into the home and cannot be enforced as it can in traffic, Joseph M. Kaplan, of the Los Angeles chapter of the National Safety Council, reminded the subcommittee session.

"Home safety for some reason has been an orphan in the society of safety problem children. It has been shunted aside in favor of its more dramatic family member, traffic safety," Mr. Kaplan said. Home safety, however, is almost exclusively an educational problem, and "rallying public support for a home accident prevention program is our only hope if we are to do something other than wring our hands in despair," he maintained.

Study Fatal Accidents To Get Representative Picture

"A study of reported fatal accidents will give a more representative picture of the accident problem in a community than will an investigation of nonfatal cases," I. Jay Brightman, M. D., Isabel McCaffrey, and Leonard P. Cooke, of the New York State Department of Health, maintained before the home accident session.

The general universality of death reporting in many States will yield data on all cases regardless of economic status, allegiance to cults, and local differences in degrees of utilization of medical, nursing, and hospital facilities, Dr. Brightman and associates said.

Reporting on a study which goes back to 1932, Dr. Brightman and his colleagues found that accidents of all types were the fifth cause of death

at that time in New York State, with a rate of 85 per 100,000. The overall rate has dropped to 67, but the home accident fatality rate rose by about 14 percent from 1932 to 1936 and has since remained steady.

The death rate from home accidents among children less than 5 years of age does not seem to have changed materially, Dr. Brightman reported. However, there have been definite declines in the age groups from 5 to 64 years. The fatality rate for those 65 and older has remained constant from 1936 to 1948. This group, he pointed out, contributes about 65 percent of all the home accidents and therefore carries a great deal of weight in the trend for all ages.

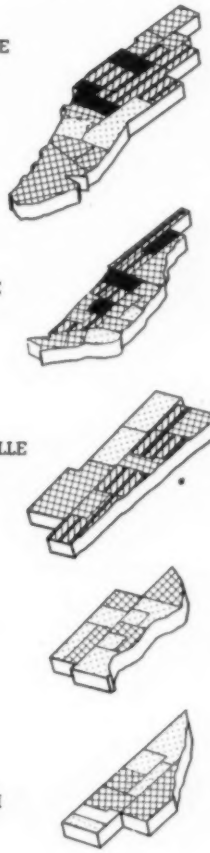
This fact, coupled with the growing proportion of older persons in the population, suggests that "the total number of fatal home accidents may be expected to increase constantly unless effective preventive measures are developed," the New York group said.

Accidental CO Deaths

Accidental domestic deaths from carbon monoxide poisoning constitute a serious health problem which warrants an intensive investigation into the causes and circumstances of these deaths and the establishment of effective preventive measures, the industrial hygiene section was informed by Jerome Trichter, assistant commissioner in charge of environmental sanitation, New York City Department of Health, and Milton Helpern, M. D., deputy chief medical examiner, Office of the Chief Medical Examiner, City of New York.

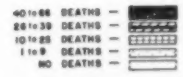
Defective domestic gas equipment and appliances were cited as a major cause of fatal accidents. There were 113 deaths from such causes in New York City in 1950. Special attention was called to the increasing incidence of single and multiple fatal and nonfatal poisoning cases due to the inhalation of carbon monoxide from improperly operating gas flame refrigerators.

Carbon Monoxide Deaths in Relation to Housing Conditions, 1940–49, New York City



Housing Conditions	
LOWER WEST SIDE	
Built Before 1900	44,102
Needing Major Repairs	30,571
Without Central Heat	34,351
LOWER EAST SIDE	
Built Before 1900	49,007
Needing Major Repairs	41,495
Without Central Heat	39,699
KIPS BAY–YORKVILLE	
Built Before 1900	25,909
Needing Major Repairs	17,438
Without Central Heat	21,845
EAST HARLEM	
Built Before 1900	22,181
Needing Major Repairs	17,167
Without Central Heat	15,901
CENTRAL HARLEM	
Built Before 1900	19,252
Needing Major Repairs	13,924
Without Central Heat	1,555

Legend



—Adapted from Trichter and Helpern.

Mr. Trichter and Dr. Helpern revealed that a survey of 20,000 New York City homes showed that a high percentage of the homes contained defective gas appliances.

They outlined the control and prevention measures taken in New York City and urged that the full resources of all official agencies, periodical inspections and servicing, health education, and newspaper publicity be used to combat the problem of carbon monoxide deaths. Health departments and medical examiner's offices should assume leadership in this program, they said.

Epidemiological Techniques

Home accidents are now regarded as a disease in the realm of preventive medicine and public health, John E. Gordon, M. D., Helen L. Roberts, M. D., and Antonio Fiore, M. D., from the Departments of Public Health Practice and Epidemiology of the Harvard University School of Public Health, said.

The changed attitude toward home accidents, which no longer will accept bad luck or chance as an excuse for death and crippling, is also responsible for a new commu-

nity approach to the problem. The Harvard scientists pointed out that "home accidents vary from community to community depending upon occupation, age of population, housing, economic resources, and many other factors. General principles in analysis and prevention may be transferred from one area to another, but only concentration upon its own home accident occurrence will enable an area, a city, or a State to define its individual situation and thus apply specific control measures."

Suggestions for carrying out a community study included drawing samples from hospital admissions for home accidents, having health department employees visiting homes for routine purposes make a home accident survey as part of their rounds, and, finally, making an intensive study of accident causes in a small and highly selected sample of the community.

EDUCATION, INFORMATION

Prevention and Education Basic to Prepaid Plans

"Health education and preventive medicine are essentials for high quality of service in any organized medical care plan," George Rosen, M. D., Ph. D., professor of public health education, Columbia University, told a joint session of the health officers, medical care, public health education, and public health nursing sections.

To the same session, Milton Terris, M. D., assistant dean in charge of postgraduate education at the University of Buffalo School of Medicine, reported that of 85 Blue Cross Plans surveyed, none employed a health educator, but 18 utilized periodical printed bulletins for subscribers and 31 were interested in developing health education programs for their subscribers.

Dr. Rosen described the organization of the Health Insurance Plan of New York which consists of 30 medical groups employing some 950 physicians and serving about 300,000 subscribers. All beneficiaries between the ages of 6 and 45 are entitled to one examination annually. Others may be examined more frequently. Health education and visiting nurse services are essential parts of the program of preventive medicine.

Patient-Group Relationships

For most subscribers, enrollment in HIP constitutes their first contact with such a program. Former attitudes toward medical practice must be changed, he noted. Establishment of adequate relationships between the patient and the group is fundamental. Some of the procedures used in HIP for this purpose were described by Dr. Rosen, as: (1) All prospective subscribers are given full information on the preventive program, printed material being distributed by the enrollment division; (2) circulars are sent to the new subscriber by the group he joins, urging selection of a personal physician; (3) bulletins are issued by the medical groups, the cost of publication and distribution being shared by HIP; (4) discussion groups are organized by medical groups, a complex and uncharted operation.

The professional and administrative personnel of medical groups have primary responsibility in developing the program, Dr. Rosen said, and HIP provides aid. Costs are shared by HIP and the group.

The program of discussion groups is designed to give guidance in health problems and organization of medical services. Investigations are conducted to identify the expressed needs of patients, Dr. Rosen reported, and four groups have been started so far. Committees are organized in the groups with both patients and physicians. In general, lectures are avoided and informal discussions are emphasized. Union organizations are employed as channels for health education. Involvement of group physicians in discussions is greatly restructuring the relationship of the physician to the patient.

Further consideration must be given, Dr. Rosen felt, to the problem of effective use of a public health nurse and the medical social worker in organization of health education through prepayment plans.

Commenting on his survey, Dr. Terris pointed out that more prepaid medical care plans are utilizing health education than was anticipated, but there is considerable room for improvement and tremendous opportunities for effective health education programs in all of the plans.

325 Plans Surveyed

He surveyed 325 prepayment plans, including 85 Blue Cross Plans. Blue Shield organizations were also included, and of 53 replying, about half indicated some interest. Among 56 industrial medical care plans, 33 replies were negative, but 14 said they were doing some educational work and 18 were interested in developing a program. Among the independent plans replying, 5 indicated no activity and 7 were interested; of 13 private group clinics, 8 had no organized program but 3 wanted to develop activities. The most active programs were those sponsored by consumer and cooperative group plans such as HIP, the Group Health Association of Puget Sound, and the Farmers Union Hospital Association of Elk City, Okla.

Mass Media Have Useful Place in Health Education

The adaptability of mass media of communications in public health information and health education was examined in two papers and followed by a panel discussion at a joint meeting of the public health education, health officers, and public health nursing sections.

Samuel C. Gale, vice president in charge of advertising of General Mills, Inc., stressed the fact that modern business, animated by enlightened self-interest, increasingly has come to recognize its obligations as a member of the total community. In assuming greater social responsibility, a business concern must also seek better public understanding of its basic policies, Mr. Gale said. Individual businesses everywhere can be found taking active part in civic affairs.

Charles W. Collier, executive vice president, Advertising Association of the West, observed that many business organizations on the local level are aware of the need for improved health education and information. One of the most effective ways of keeping people well, he said, is to keep them well informed. He stressed the fact that health educators and health information personnel should make use of all mediums of communication.

5-Point Panel Agreement

The ideas of Mr. Gale and Mr. Collier were discussed by a panel of public information officers and health educators consisting of Ruth E. Burcham, R. N., executive director of the San Francisco Visiting Nurse Association; John D. Fouts, M. D., M. P. H., district health officer, Bellingham, Wash.; J. Stewart Hunter, M. A., Assistant to the Surgeon General for Information, United States Public Health Service; Granville W. Larimore, M. D., M. P. H., director of the office of health education, New York State Health Department; John D. Porterfield, M. D., M. P. H., director of health for Ohio; Abbie G. Whidden, R. N., director of the St. Louis Visiting Nurse Association; and Netta W. Wilson, M. P. H., senior health information consultant of the Minnesota Department of Health.

Ann Wilson Haynes, M. P. H., director of health education of the California Department of Public Health, acted as moderator, and Homer N. Calver, secretary of the Public Health Committee of the Paper Cup and Container Institute of New York, summarized the discussion.

Among the points on which there was consensus of opinion among the panel members were the following:

1. Techniques of mass media are clearly applicable to the field of public health education and information, but they should be supplemented by other techniques.

2. An effective public health education program depends upon high-level and careful planning.

3. Public health education and information programs must be measured in terms of the relative success of immunization programs, trends in accident rates, or similar indices of health in a community.

4. Community organizations, such as health councils and voluntary health agencies, offer a useful and effective means of promoting better understanding of public health measures, and their facilities should be carefully considered in planning health education programs.

5. Public information and health education is a continuous process. The program must be comprehensive and include potential as well as immediate hazards.

World Health Education Role To Be Wide and Complex

The potential role of health education as an integral aspect of total health and socioeconomic development is one of tremendous scope and complexity, said A. Helen Martikainen, M. P. H., chief of the health-education-of-the public section of WHO. Speaking to the public health education section of the APHA, she outlined the objectives and program of WHO in this field, as follows:

1. Fellowship assistance. There is a critical lack of professionally trained health educators. Fellowship aid, which may be requested by 12 to 15 countries in the next two or three years, is of major importance in building needed professional leadership.

2. Assistance to educational institutions. There is an obvious need to incorporate theoretical and practical preparation in health education into educational programs for professional health personnel.

3. Assistance of short-term consultants. Several countries have requested such assistance, which usually involves a broad review of existing health education problems and consultation as to future programs.

4. Assignment of personnel on a long-term basis to national programs and demonstrations.

5. Regional health education conferences. From such conferences, Miss Martikainen declared, "will evolve the real inspiration, impetus, and substance for world trends and guideposts."

6. Joint cooperation with other specialized agencies of the United Nations and nongovernmental organizations. Particularly noteworthy is the collaboration of WHO with UNESCO in the establishment of regional centers in fundamental education.

PUBLIC HEALTH NURSING

Home Service Proved, MLI Support Ends in '53

The visiting nurse program of the Metropolitan Life Insurance Company, started as a demonstration in 1909, is to terminate in 1953, according to William P. Shephard, M. D., of the San Francisco office, and George M. Wheatly, M. D., of the New York office of the health and welfare division of the Metropolitan Life Insurance Company.

The Metropolitan Life Insurance Company believes that the visiting nurse program has demonstrated the value of home nursing service, and that voluntary agencies now should carry on the work, Dr. Shephard pointed out. The company is working with the National Organization for Public Health Nursing to develop service in areas from which the Metropolitan program is being withdrawn.

Dr. Shephard pointed out the powerful educational medium in the bedside program of the visiting nurse association, or similar groups, and the saving of physicians' time by reducing hospital days 1 to 3 days by a good visiting nurse program.

Combination Services

The most effective use of the available supply of public health nurses was considered in a study to evaluate combination nursing services, Pearl McIver, M. A., chief of the Division of Public Health Nursing, Public Health Service, reported to the public health nursing section.

Five combination services in cities in different geographic areas were evaluated in the National Organization for Public Health Nursing study.

The study included analysis of questionaires filled in by each agency, Personal interviews with private physicians, health officers, staff nurses, voluntary association board members, community chest officials, and those who had received nursing care were evaluated. Administrative practices of the agencies were also considered in the study.

None of the agencies had sufficient personnel to meet currently accepted standards, Miss McIver stated. However, all were convinced that the services of each nurse were utilized more economically under the combination plan.

Cancer Nursing

The nurse who is well prepared in cancer nursing and in its public health aspects can be a powerful adjunct to the medical profession in promoting cancer control programs, the Public Health Cancer Association heard from Rosalie I. Peterson, R. N., of the National Cancer Institute, Public Health Service.

Broad educational preparation is essential for all nurses if they are to function in control programs as well as in hospital services, Miss Peterson pointed out. She reported that some of the problem areas are patient management in a cancer clinic, teaching the patient self-care, planning for continuity of care, and community planning for a cancer control program.

A monograph on cancer nursing for use in the basic professional nursing curriculum has been developed, Miss Peterson reported.

Children's Eye Problems

Public health has made major contributions to saving sight, but there is still no justification for complacency, Helen E. Weaver, R. N., M. P. H., consultant in nursing activities, Society for the Prevention of Blindness, stated in a session of the society.

Parents should be encouraged by the public health nurse to have an eye examination made by a competent eye specialist during the infant's early life, she continued. Before the child begins school a complete eye examination is again desirable. Screening tests must also be considered an integral part of the school health program, Miss Weaver emphasized.

Public Health in Civil Defense

KANSAS FLOOD

Enemy or Nature—Aims in Emergency Are Same

A catastrophic flood demanded herculean efforts—and received them—when Kansas rivers rose to a historical peak. Sixty percent of the average annual rainfall fell in May and June; the remaining 40 percent, in a 3-day period beginning on Friday, July 13, Dwight F. Metzler, chief engineer of the Kansas State Board of Health, said in reporting to the engineering section and the conference of State sanitary engineers on the emergency sanitation lessons derived from the 1951 flood in Kansas.

Water and food supplies and sewer systems were disrupted. The handling of refuse, the disposal of corpses (16,000 animals in this case), the control of flies and other insects, emergency housing, and rehabilitation became major problems. Yet, the only known disease outbreak, Mr. Metzler noted, occurred, not at mass-feeding centers where local and State health department sanitarians made frequent checks, but among a utility crew using a common drinking cup!

The lessons learned in Kansas were many and would apply to other types of disaster, either natural or man-made, Mr. Metzler declared.

A preplan should include: a director to coordinate all sanitation measures and to channel all assistances; a classified list from which to draw a committee of technical persons, who should be given adequate authority; a central information service to keep in close contact with the people, to avoid panic; adequate communication and transportation systems depending upon a mutual aid program in which mobile equipment may be supplied by unaffected communities within and without the State; a map of emergency sources of water supply available to key personnel.

In addition, Mr. Metzler felt, there should be built up a larger reserve chemical feeding capacity at water plants, provision for more water storage capacity to be located far above the possible high-water area, establishment of a fund to purchase small supplies ("A few pairs of boots or several hand sprayers were more difficult to purchase than four planeloads of DDT"), valves on all drains and pipes through dikes of every existing waterworks; placement of new construction high enough to prevent leakage into clear wells.

Federal Services Directly Aided States in Flood Crisis

Planning to meet health emergencies on a national scale is a full-time, continuing job, M. Allen Pond, M.P.H., chief, Engineering Resources Division, Public Health Service, told the joint meeting of the conference of State sanitary engineers, the conference of municipal public health engineers, and the engineering section. "Whatever the cause of the emergency, the aims of those who meet it are the same—to confine the damage, to restore order, and to rehabilitate the people and the facilities affected," he said.

Mr. Pond illustrated his remarks by the recent flood. The resources of two great States, he said, proved inadequate to cope with the health

problems that rose with the rivers in Kansas and Missouri. The yeoman efforts of State and local health authorities resulted in confining the damage so that public health measured in terms of morbidity and mortality did not suffer during or after this disaster. But, even in a comparatively slow-developing emergency involving no serious casualties to health service personnel, or to the public generally, the State health authorities requested aid, and assistance had to be assembled from points east, south, and southwest. The fact that assistance could be made available immediately, Mr. Pond declared, is traceable to the disaster-planning activities of the Public Health Service Communicable Disease Center. From New York, Georgia, Mississippi, and Texas immediate help came in the form of personnel, equipment, and supplies.

Three Action Steps

First, estimates of damage and necessary emergency action were made by the State health authorities. Plans were made on the scene and put into immediate effect. Second, restoration of basic utilities and services was made as rapidly as possible. The third step was rehabilitation.

The President of the United States, invoking the provisions of a newly enacted law (P. L. 875, 81st Cong.), asked Congress for and was granted funds to assist the people of the area to meet the crisis. He designated the Housing and Home Finance Administrator to coordinate Federal flood relief, Mr. Pond said.

The Food and Drug Administration personnel assigned to the area placed an embargo on all food, beverages, drug and cosmetic stocks, and supervised salvage operations. This action confined the results of the damage.

The Department of Agriculture Extension Service helped to clean up farms and to protect animals against disease hazards. The Soil Conservation Service helped to rehabilitate wells.

The Department of Defense aided in the evacuation of persons, and provided spray crews and air transport for Public Health Service supplies and equipment.

PHS and NPA

The National Production Authority made critical materials available. A Public Health Service officer was named Kansas City representative, pro tem, of the Division of Water Utilities of the NPA.

When the third step, rehabilitation, was reached, the Public Health Service stepped aside for the Housing and Home Finance Administrator.

Although responsibility for civil-defense activities rests in State and local agencies, no community—no State—is able to muster all the supplies, equipment, and personnel, Mr. Pond said, that will be needed after a major attack with weapons of modern war used openly or covertly against the civilian population. Civil defense must plan for casualty services on an almost incomprehensible scale.

HEALTH SERVICE

CD Efforts Can Have Long-Range Benefits

"The local health officer's view of civil defense is really a worm's eye view," according to H. D. Chope, M.D., Dr. P. H., director of the San Mateo County public health and welfare department, speaking before the engineering section and conference of State sanitary engineers.

"Woe, worry, and work" have gone into the effort, yet Dr. Chope thinks it was wise to place the responsibility for civil defense in the hands of State and local health officers. He summed up the benefits and compensations accruing to the health officer from all the extra work under five heads:

Areas of Benefit

1. Working relations with other public officers have improved. Upon the local health officer rest the lives and safety of thousands of people.

2. Professional relationships have been solidified. Private physicians long have looked to the health department for advice in communicable disease and tuberculosis control, vital statistics, and laboratory diagnosis. Under the pressure of civil defense, they look to health officers for aid and direction in related fields of medical practice.

3. Jurisdictional frictions have diminished.

4. Demands for a civil defense organization have shown that public health staffing is inadequate.

5. The health officer has discovered hidden potentialities in people. Nurses, engineers, laboratory and X-ray technicians no longer active in their fields or else employed outside the county, public health officers living in the county, and voluntary agencies have offered their services and been willing to subjugate their identities in an over-all organization.

Community Organization Value

Dr. Chope summed up: "If the time should ever come when our Nation is not threatened by the danger of war-caused disaster, it would be nothing short of criminal to allow to lapse all that we have accomplished to date in this particular field of community organization. The advantages which I have listed can apply to a peacetime disaster program just as well as they apply to the organization for a war-caused disaster. Although I do not advocate making disaster planning a seventh point in the standard public health program, I do feel that it should be an obligation of every local health officer to keep current at least a paper plan for disaster and bring into his planning and organizing as many community facilities and agencies as possible. The fact that we were so poorly prepared and it has taken us so long to work out our present plans, I feel is an unhappy commentary on the foresight of local health officers throughout the Nation. We all hope that neither war-caused disasters nor peacetime disasters will overtake our communities but should this occur, local health administrators should be prepared to provide the essential community leadership to meet the situation."

California at Threshold of State-Wide Sanitation Plan

California is "at the threshold of the actual job of developing an adequate state-wide civil defense environmental sanitation program," Arve H. Dahl, chief of the sanitation section of the division of medical and health services, State Office of Civil Defense, told the session.

Preparations have included, Mr. Dahl said, agreement with other divisions of the civil defense organization on areas of concern; development of an operational manual for environmental sanitation procedures and policies; working with health department sanitation personnel on how to serve as the catalyst to make this program possible; and development of plans and material for training of auxiliary personnel.

Seven environmental sanitation areas to be considered by divisions of medical and health services in every civil defense organization were listed by Mr. Dahl: sanitation of emergency medical facilities, emergency water supplies, emergency sewage disposal, emergency food sanitation, emergency vector control, service to evacuation and welfare services, and industrial sanitation.

Mr. Dahl reported that in Los Angeles the city health department has produced television shows instructing families on how to take care of sanitation problems around the home. "The education of the public in sanitation procedures is one of our key objectives," he said.

CD Records Systems Cannot Be Improvised After Attack

"The totality of modern war requiries civil defense, and civil defense requires reliable quantitative information which will reveal the status of the essential resources, the population and the environment—before, during, and after enemy-caused disaster," Henrietta Herbolsheimer, M. D., M. P. H., deputy director in charge of health services and special weapons defense of the Illinois Office of Civil Defense, maintained before the statistics section and the American Association of Registration Executives.

Dr. Herbolsheimer said that record keeping and information services to meet the demands of a colossal emergency cannot be improvised after attack. The system must be set up in advance and be "extremely simple, flexible, and foolproof." She cited four needs: (1) forms for tallies of resources and a system to keep the inventory current during operations; (2) information on population distribution and composition to carry out vulnerability analysis, and to make casualty estimates; (3) a definition of a casualty; and (4) records to cope with the population problem after incident.

It is up to civil defense to plan for the kind of evaluation services which will procure operational intelligence at the time of a disaster and in the postdisaster period for rehabilitation, the Illinois official said.

3-Fold Task of Laboratories Requires Advance Planning

Laboratory services for purposes of civil-defense planning are those concerned with the role of the laboratory in (1) the detection of actual or potential disease-producing biological or chemical agents whether naturally occurring or disseminated by enemy action, (2) diagnostic and management procedures employed in clinical medicine, and (3) the investigation of causes of morbidity and death, Gustave J. Dammin, M. D., laboratory consultant to the Federal Civil Defense Administration and professor of pathology at Washington University School of Medicine reported to the engineering, epidemiology, health officers, and laboratory sections.

The responsibilities at State level resemble, in a general way, those at Federal rather than local level in that they are (1) advisory, (2) coordinative with reference to critical target areas, (3) concerned with provision of financial support, and (4) supportive in providing such services as definitive studies in microbiology and other diagnostic procedure, Dr. Dammin said.

The basic operating responsibility for civil defense is in the individual and his local government, Dr. Dammin said. Clinical and anatomic pathology services and public health laboratory services must continue in a similar but somewhat restricted form in the postattack phase, and the preattack training should be related mainly to monitoring procedures. The laboratory service unit should be active now in conducting an inventory of personnel, supplies, equipment, and facilities. All technicians, active or inactive, should be known to the laboratory service unit of the civil defense health service, he emphasized.

BIOLOGICAL WARFARE

Research, Epidemiology Support Local Action

The Federal Civil Defense Administration will furnish leadership and planning for defense against biological warfare, but an effective defense rests on State and local efforts, and requires the complete cooperation of health organizations and professions, a joint session of the engineering, epidemiology, health officers, and laboratory sections was told by Robert H. Flinn, M. D., and Norvin C. Kiefer, M. D., of the health and special weapons division of the Federal Civil Defense Administration. They warned that a determined and resourceful enemy could effectively employ biological warfare agents against humans, animals, and crops, either by sabotage or by overt attack.

Many Pathogenic Agents

Any of a wide variety of pathogenic agents could be employed against our people, they declared, and could be disseminated through air, food, or water in a number of different ways. They listed civil defense measures in five broad categories:

1. Detection. A wide variety of instruments are available for air sampling, but better methods are being sought. Initial recognition of unusual agents in air, water, or food

is a task for local laboratory technicians, who can also in many instances identify the agents. The FCDA hopes to provide the special training necessary for these tasks through existing Government facilities, such as the technical centers of the Public Health Service. Federal or federally sponsored laboratories, organized on a sectional basis, will provide more exact identification where needed.

Initial Diagnosis of Cases

2. Epidemic intelligence. In many cases, the first positive evidence of biological warfare attack is likely to be the diagnosis of actual cases of disease. Prompt diagnosis and immediate reporting of such diseases would be imperative. Existing epidemiological and reporting systems require expansion, strengthening, and integration into a nation-wide network, sponsored by the Public Health Service, Drs. Flinn and Kiefer said. For actual investigations, mobile teams of qualified epidemiologists, sanitary engineers, veterinarians, public health nurses, and other professional personnel should be organized.

3. Personal protection. Although it is not feasible to immunize the general public against all probable biological warfare agents, the civil defense agency, and the health agency in each target community should be prepared to conduct a rapid immunization program at any time it is advised to do so. In addition, methods and materials for treatment with biological preparations, antibiotics, or drugs should be ready for any emergency.

A well-informed public is necessary to check rumor and panic. The FCDA booklet, "What You Should Know About Biological Warfare," has been given wide distribution, and a print of the 16-mm. film based on the booklet has been provided to each state and regional civil defense director.

4. Collective protection. Air-conditioning systems of key buildings must be protected against sabotage, and air-raid shelters should be equipped with adequate filters. The best defense against sabotage, in addition to internal security measures, is the expansion and maintenance of rigid safeguards for water and food supplies.

5. Decontamination. For ground, streets, or buildings, flushing with a fire hose or, in some instances, washing with hypochlorite, might be necessary to remove biological warfare agents. Indoors, the usual washing, airing, and sunning procedures should be followed.

Dr Flinn and Dr. Kiefer warned that nonbiological attack, for example, by an atom bomb, might result in contamination of water supplies and destruction of sanitary equipment, thus inviting the spread of diseases usually present in the United States.

Funds made available to FCDA for biological warfare are very limited, the two officials noted. Plans call for intensive training of approximately 350 public health administrators, laboratory personnel, epidemiologists, sanitary engineers, and other specialized personnel, using the Public Health Service facilities already in existence for training and research purposes. The health and special weapons division is also planning to stockpile antibiotics and biologics needed for protection against biological warfare.

Sectional Research Program To Stimulate Microbiology

Plans for a sectional research program in microbiology to encourage original research in problems of infectious disease and to develop more definite collaboration between research centers and health agencies was announced to the joint session by Dorland J. Davis, M. D., of the National Microbiological Institute, Public Health Service.

Patterned after the influenza study program, the microbiology program will have 12 outstanding investigators in various parts of the country working with other scientists in their vicinity. Associated with each of them will be from 5 to 10 nearby participating laboratories located in universities, State health departments, hospitals, or research institutions.

These laboratories have been selected to cover broad fields of interest in microbiology. In general, there are laboratories in each section which have specialized interest in virus, rickettsial, mycotic, exotic, bacterial, and veterinary diseases transmissible to man.

Research, Not Administration

Research grant funds will be available for the support of this research, Dr. Davis explained. The laboratories will not do routine diagnostic work, nor participate in public health administration.

Information from the participating laboratories will be made available to the State health officers through Public Health Service regional medical directors. The program will be coordinated in the National Microbiological Institute of the National Institutes of Health.

Investigations of the Communicable Disease Center and State health departments may be supported on request by such services as the laboratories of the sectional research program are willing and able to provide.

This program should bring beneficial results not only in better preparation for national defense but also in improved methods for normal public health activities and particularly in reciprocal collaboration between research centers and official health agencies, said Dr. Davis.

New PHS Epidemic Aid Plan Provides Training and Services

Because of the lack of trained epidemiologists even for peacetime needs, the Communicable Disease Center of the Public Health Service has organized an epidemic intelligence service, with the ultimate objective, as described by Alexander Langmuir, M. D., and Justin Andrews, Sc. D., of promoting a wider understanding and appreciation of epidemiological approaches to the problem of disease control.

In July 1951, a group of 21 medical officers began training in epi-

demiology, biostatistics, and public health administration as it relates to communicable disease control. Following this course, they were assigned to selected field training areas, either in State or local health departments or in Public Health Service field stations. All of the men will be available for epidemic aid services upon request.

As a result of this training, some of the officers may remain in full-time epidemiological or public health work, while the others returns to civilian academic or clinical practice, but in the event of war they could be returned to active duty with the Public Health Service, Drs. Langmuir and Andrews said.

Knowledge of Public Health Environmental Factors Poor

Our concern about biological warfare is really a recognition that our knowledge of environmental factors affecting the public health is deficient in many important respects, Leslie A. Chambers, Ph. D., research director of the Public Health Service's Environmental Health Center, Cincinnati, told the joint session.

There is insufficient information available at present on the viability of airborne organisms when subjected to adverse environmental influences such as sunlight and dessication, he pointed out. As a consequence, "we cannot predict, even roughly, the dosages that might be delivered to a population exposed to a biological attack by the airborne method." There is similar lack of information, he said, with respect to the number of bacteria or viruses necessary to produce a disease reaction in a human host.

Dr. Chambers noted that diagnostic bacteriology, as now practiced, depends to a large extent on a knowledge of the source of the sample and the conditions with which it is associated. There is need for the compilation of a concise, systematic approach to the laboratory determination of potential biological warfare agents in whatever type of materials that come into question, he said. He also declared that more rapid identification procedures can and must be devised.

Organized Animal Disease Control Basic BW Defense

Basically our defense against biological warfare on animals is an effective organization for communicable disease control, Frank A. Todd, D. V. M., consultant on veterinary services for the health and special weapons division of the FCDA, told the joint session. The Bureau of Animal Industry, cooperating with State veterinarians, provides the nucleus of such an organization, he said.

In the event of widespread outbreaks of animal diseases deliberately introduced, he said, the normal control measures, such as quarantine, disinfection, and destruction of exposed animals, might necessarily be modified or augmented, possibly by the use of vaccines or other biologics.

Food and Nutrition

EMERGENCIES

Morale, Panic Control C. D. Nutrition Purposes

Bread will earn its title, "staff of life," Robert S. Goodhart, M. D., scientific director of the National Vitamin Foundation, and Norman Jolliffe, M. D., director of nutrition, New York City Department of Health, told the food and nutrition section.

Speaking on emergency feeding plans of New York City in case of a catastrophe, Drs. Goodhart and Jolliffe said that the primary purpose of a program is not nutrition but the maintenance of morale and the avoidance of panic. It must be designed to take care of special groups: (1) children, expectant and nursing mothers; (2) sick and injured; and (3) essential workers.

Nutritional requirements for periods of 1 week or less are both quantitatively and qualitatively less than allowances for longer periods. These doctors emphasized that during the first 48 to 72 hours after a bombing the only essential nutritional requirement for the major part of the population, to maintain life, is water. Many of the essential nutrients are stored in the body to a considerable extent. Thiamine is the only micronutrient a deficiency of which has been shown to produce symptoms in man within less than a month.

If bread only is available, the doctors said, sufficient nutrients in an accepted form to sustain life and morale for a period up to a week can be supplied by 1½ pounds of bread daily. However, menus are planned to consist of 1 pound of bread plus about 400 calories from other safe, locally available foods. It is expected, they said, that these minimum nutritional allowances will be exceeded in most instances.

Essential workers should be given a meal every 4 hours while working. The allowances for them per meal have been set as follows:

Energy	cal.	1,400
Protein	gm.	25
Thiamine	mg.	0.875
Water	qt daily	4

When the nutritional requirements are modified by disease, injury, or burns, the maintenance of an optimal balance of electrolytes and fluids during the first 24 hours often determine survival, these doctors said.

Burns and Radiation

In the practical nutritional care of patients with severe thermal injuries, prophylaxis is preferable to and easier than therapy, Stanley M. Levenson, M. D., of the Army medical nutrition laboratory at Chicago and the Medical College of Virginia, Richmond, told the food and nutrition section in a paper prepared

with Elizabeth A. Lounds, M. A., and Mattie M. Robinson, B. A., of the dietary department of the Medical College of Virginia.

Complete Metabolic Mixture

Dr. Levenson stated that the food provided to burned victims must be a complete metabolic mixture containing adequate amounts of protein, carbohydrates, fat, minerals, water, and accessory food substances. If possible, the nutritional demands should be met by oral feeding. If not, gastric, jejunal, and parenteral feedings, singly or in combination, must be carried out, he said.

The optimum quantities and proportions of the various foodstuffs have not yet been established, and investigators are not agreed as to how early high intakes should follow injuries. But, Dr. Levenson said, children receiving from the start an intake one and one-half times that recommended by the National Research Council as optimal for normal individuals remain in excellent nutritional status following severe burns.

Male adults (previously well) receiving from the start an intake of 1½ grams of protein and 45 calories per kilogram of body weight show nutritional depletion if the burn is severe—but less than if this intake is not begun very early. The nutritional requirements of nonpregnant women suffering from severe burns are lower than those of males with similar injuries.

Dr. Levenson and his colleagues recognized that, although supplying adequate food to patients is simple and easy in theory, practically it is often difficult. The ill patient often has a poor appetite and will not eat. Furthermore, shortage of kitchen and ward help and adequate nursing staff makes the control of diets difficult. Often the most important dietary items are not consumed. Under these conditions, he said, it is well to place the major emphasis on high-protein, high-calorie, and high-vitamin liquid diets. In the case of mass casualties from radiation injury, the liquid diet is apt to prove the more practical method.

Dr. Levenson emphasized that there is not enough information at hand to outline with certainty the nutritional care of patients with radiation injury. Data available suggest that individuals in good nutritional status at the time of injury resist radiation injury better than those in poor nutritional states; that morbidity and mortality are less in individuals whose nutrition is maintained at high levels after injury.

In cases of combined thermal and radiation injury, Dr. Levenson said, it probably will not be possible to feed the patient orally to the same extent as patients with burns only. The effects of antibiotics on nutrition have yet to be determined; the place of blood transfusions is not established; nor is the role of sulfhydryl compounds and various hormones.

FOOD PROCESSING

Antibiotics, Radiation Possibilities in Canning

Procedures that may revolutionize the processing of canned foods—such as the use of antibiotics and various types and sources of radiation—are on the horizon, Charles F. Townsend of the western branch laboratory of the National Canners Association and the University of California laboratory for research in the canning industries predicted before the food and nutrition section.

The rapid changes in methods and scientific knowledge demand constant readjustment on the part of all those concerned with scientific canning, Mr. Townsend said. Education in the principles of processing procedures is as important for the public health worker as for the canning operative.

High Speed Evaporation

The direct and indirect effect on the general public health of recent food processing developments which have made possible rapid evaporation at high speed—not at higher temperatures, but at extremely low temperatures—were discussed by George D. Armerding, of the Mojonnier Brothers Company.

Mr. Armerding said, "Not all of the bad factors encountered by reason of low temperature evaporation can be chargeable to the manufacturer or producer." He went on to show that the dilution or reconstitution of frozen orange juice concentrate is out of the control of the producer.

Health Laws Needed

There are some disadvantages, Mr. Armerding admitted, but he said that the very fact that we recognize them will bring about a way to eliminate them. These low temperatures are optimum for the development of bacteria, mold, and yeast growth or fermentation. It therefore becomes highly important so to construct the equipment that the product will be processed rapidly, continuously, and without the possibility of "pocketing." There is a temptation on the part of the operator to prolong the operating time without shutting down the machinery for cleaning at safe intervals. Health laws must be written to control such practices, Mr. Armerding said.

GENERAL DEVELOPMENTS

Enriched Rice Reduced Beriberi in Bataan 90%

Spectacular results in reduction of mortality from beriberi during a year of the rice-enrichment project in Bataan were reported to the food and nutrition section by Elena S. Quiogue, B. S. E., of the Institute of Nutrition, Department of Health of the Philippines.

For the last full year before the enrichment program (July 1, 1947 to June 30, 1948) there were 263.57 deaths per 100,000 from beriberi; for the first corresponding period during which the enrichment was in force (July 1, 1949 to June 30, 1950) the rate was 28.17 per 100,000.

During the first full year of rice enrichment, there was a decline of 67.3 percent in beriberi deaths in the experimental zone and an increase of 2.4 percent in the control

zone, as compared to the year before the enrichment program began. In the experimental area, she said, enriched rice had apparently saved the lives of 111 people in 1 year.

The Philippine Government is going ahead with plans to extend the benefits of rice enrichment to more of its people, she said. By the end of this year it is expected that 1,800,000 people, or approximately 10 percent of the entire population, will be reached. Because of the beriberi death toll of 4,400 persons per year "health authorities are greatly concerned about legislation providing for compulsory enrichment of all white rice in the country," Miss Quiogue reported.

Animal Nutrition

Discovery of insulin and use of cortisone and ACTH are outstanding examples of the rapid advance in the prevention and treatment of metabolic disturbances resulting from modern methods of animal feeding with purified diets, Agnes Faye Morgan, Ph.D., chairman of the department of home economics, University of California at Berkeley, told the conference of public health veterinarians. Similar imminent achievements are clarification of the etiology of high blood pressure, arteriosclerosis, and, possibly, cancer.

Animal feeding experiments carried on in the home economics laboratory of the University of California on fresh, evaporated, and dried milk, casein, lactalbumin, eggs, beef, peanut meal, wheat gluten, and other cereal proteins demonstrated differences in protein values of foods. At no level of feeding, Dr. Morgan said, did peanut meal or wheat gluten produce normal growth in young dogs, and when good proteins like those of milk, beef, and eggs were overheated, similar failures occurred.

Another experiment, in which vitamin E was fed at various levels to turkeys from 2 to 35 days before slaughter, showed that enough of the vitamin could be retained in the turkey tissues to act as antioxidant and prevent rancidity in frozen storage. Similar studies (done elsewhere) with pork were not successful, perhaps because of the lower retaining capacity of the pig tissues, Dr. Morgan felt. Experiments with rats and rabbits resulted positively as with the turkeys.

Diets poor in quality and quantity of protein, Dr. Morgan said, cause a depletion of liver protein and, consequently, of plasma proteins. Hence, "weight reduction by pregnant women should be cautiously directed so as to avoid any premature or unfavorable depression of liver tissue."

Nutrition Education

Growth of body, mind, and conscience is the goal toward which nutrition education is directed, Jennie I. Rountree, director, School of Home Economics, University of Washington, reported to a joint session of the dental health, health officers, and school health sections.

Nutritional knowledge can be used to improve family, community, and world conditions, she said, and one of the principal problems is to make the people realize the importance of food for efficiency, sane adjustment, long life, and happiness. Teachers have a splendid opportunity in the classrooms to influence their pupils, through friendly and interesting discussions of nutrition and its effect upon the individual.

Miss Rountree pointed out that the nutrition student "will see that undernourished bodies are tied up with pessimistic, self-centered, prejudiced, cynical minds; that hungry people cannot be interested in abstract ideals like democracy . . . Nutrition well taught will make people glory in America, its agriculture, its industries, its education, its research, its pure food, its public health mindedness and its possibilities for humanitarianism."

The Health of Mother and Child

RE-EVALUATION

MCH Needs Over-all View, New Study Criteria

"Emphasis on a holistic approach to the study of intra-uterine death and congenital defect is essential if the multiple causes which operate in human society are to be clarified and controlled," Theodore H. Ingalls, M. D., of the Harvard University School of Public Health, told the sections on food and nutrition, maternal and child health, and public health nursing.

Two centuries of observation and scientific study indicate that acquired malformations are, for the most part, preventable, he pointed out, and said, "As yet, however, there is insufficient information upon which to base an effective program for the control of prenatal disease except that involving specific maternal infections.

"The mass problem is not a simple matter of cleft palates, or anencephalic fetuses, or maternal illnesses, but is concerned with maternal and fetal health as a holistic, biological system," Dr. Ingalls stated. Epidemiologically, the manifestations of prenatal disease are revealed not as a collection of unrelated clinical entities, but as related series of time-specific arrests of development.

He said: "If anencephalus has epidemiological associations with spina bifida, and hydrocephalus; if mongolism cannot be studied satisfactorily as an entity unrelated to cleft palate, dental, and cardiac defects; if diabetes, erythroblastosis, and eclampsia have interrelation through hydramnios; if the problem of cerebral palsy of the brain, retrolental fibroplasia of the eye, and hyaline membrane of the lung overlap—then we are not coming to grips

with the totality of factors at work when each one of the problems is explored as though the others did not exist or had no reciprocal bearing on the one under scrutiny. This is not to plead against directed and limited efforts," Dr. Ingalls concluded, "but for the eventual synthesis of these efforts in the study of pregnant populations—a kind of Manhattan Project for mankind."

New York City Guide Lines

New criteria for maternity and newborn care programs to aid in evaluation of their present status and for the guidance of administrators and clinicians in program planning were called for by Helen M. Wallace, M. D., Edwin M. Gold, M. D., Margaret A. Losty, R. N., and Herbert Rich of the maternity and newborn division of the New York City Department of Health.

They reported on more than 7 years of experience in New York City. The study included records of births, deaths, and fetal deaths, surveys of hospital maternity and newborn services and reports to the health department.

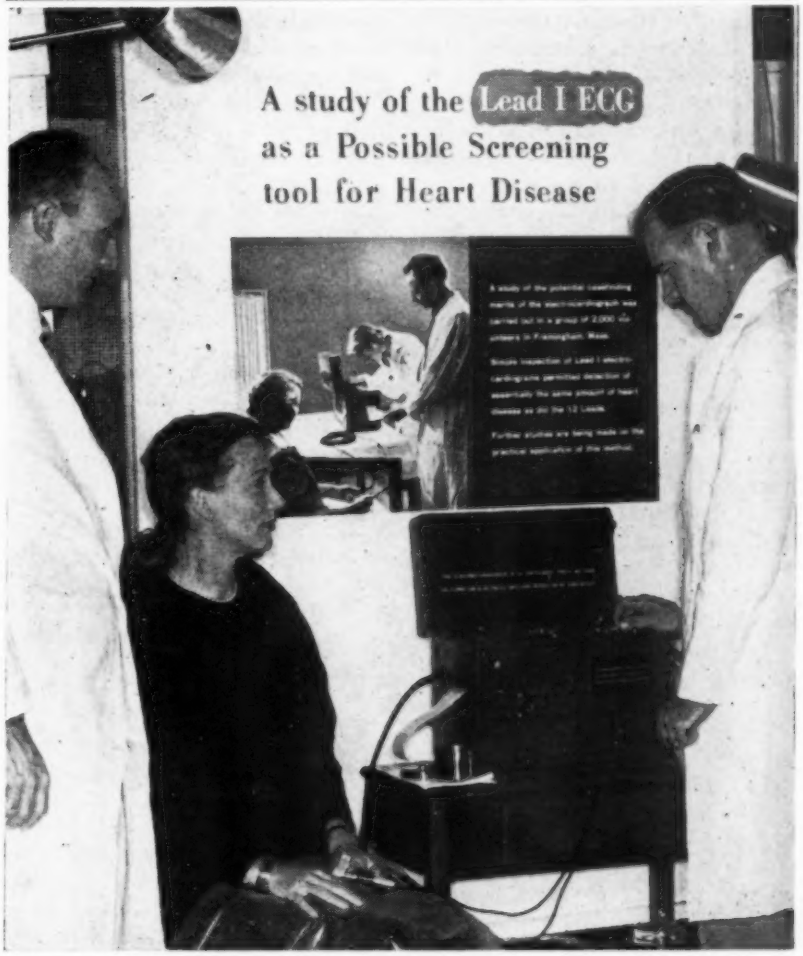
Criteria developed from data reported to the health department have been used for studies of antepartum care, policies of hospital consultation services, hospital experiences of obstetric patients, and infant feeding. They also utilized the referral of antepartum patients with incipient serious medical or obstetric complications to the community public health nursing agencies for follow-up at home as a hospital criterion.

Maryland Maternal Program

An important gap in maternal care for low-income groups has been filled through a joint effort of the private physician and the Maryland State Department of Health, reported John Whitridge, Jr., M. D., and Edward Davens, M. D., of the department's division of maternal and child health.

They described the 23-year-old Maryland public health maternity program, and interpreted statistical studies for a 6-year period (1945–50) covering 11,052 pregnant women.

Clinic centers in Maryland, the study revealed, now serve approximately one and a third million of the State's rural population. In collaboration with a large teaching



The potential case-finding merits of lead I as compared to 12 leads of the electrocardiograph as a method for detection of heart disease was demonstrated by the National Heart Institute, Public Health Service, in an exhibit during the seventy-ninth annual meeting of the American Public Health Association in San Francisco.

The demonstration-exhibit was based on a study being conducted by the heart disease epidemiology study in Framingham, Massachusetts, where a group of 2,000 volunteers has been examined by this method. This study shows that inspection of lead I electrocardiograms permits detection of essentially the same amount of heart disease as the 12-lead ECG. Further studies are being made on the practical application of this method, which is a simplified procedure consisting of a lead I conductor grasped in each hand or attached to the base of each index finger.

Over 700 ECG tracings were made in San Francisco as part of the Public Health Services exhibit-demonstration. Interpretations were sent to the participant's own physician, if he so desired. In the photograph, Dr. T. R. Dawber, in charge of the Framingham study, watches as R. E. Changon, technician at the Public Health Service Hospital in San Francisco, makes a tracing.

hospital, a workable plan of treating patients with serious abnormalities has been established, Drs. Whitridge and Davens said.

The percentage of hospital deliveries has increased from 34 in 1945 to 60 percent during 1950, they reported. A significantly lower fetal, neonatal, and maternal mortality rate was shown for Negro patients in the clinics in comparison with the nonclinic group. Lack of accommodations in hospitals, particularly for Negro patients, played a vital role in the high mortality rate among Negro patients in the 6-year period.

Measurement is Practicable

Although seriously questioned by many, the value of school health services can be measured by adequate study, Alfred Yankauer, Jr., M. D., M. P. H., of the Rochester (N. Y.) Health Bureau and the University of Rochester School of Medicine and Dentistry, maintained before the school health section.

Dr. Yankauer suggested new approaches along four lines: the critical comparison of the results of routine examinations on a group of school children with their school health record; the use of selective service and absenteeism statistics; the use of reports from physicians and hospitals to see if conditions existed which could have been discovered in school; the careful analysis of referrals made by the school health service.

SCHOOL HEALTH

Cooperation In New Techniques

The teacher observation method, a careful physical examination, and unhurried conferences with parents and teachers are valuable to school health programs, Mary P. Warner, M. D., pediatric consultant, Washington County Health Department, Hagerstown, Md., told the dental health, maternal and child health, and school health sections, and the American School Health Association.

Dr. Warner reported a threefold basis of the Washington County program:

1. The organization and administration of a program for the health needs of children of school age is a joint responsibility of the department of education and the department of health.

2. To be fully effective, the activities of these departments must be supplemented by other community groups.

3. The primary responsibility for the medical care of the school child should rest with the family, and every effort should be made to foster awareness of this obligation in parents. Since it is the family physician to whom most families turn when they have medical problems, his role is of prime importance.

Wetzel Grid in Seattle

The Wetzel grid is proving useful in school health programs and should be considered as an additional means of screening rather than as a substitute for other methods, Elizabeth Bryan, M. D., pediatrician of the Seattle-King County Health Department suggested to the American School Health Association.

Describing recent exploratory projects in King County, Dr. Bryan said that nurses and teachers have found the grid valuable in counseling older children on diet, rest, and relaxation. Physical educators are using it as a basis of classification for physical activities. Parents have aided in plotting data with a high degree of success, she reported, but emphasized that the use of the grid be considered only if the preparation required in planning for its use can be furnished.

Training in the use of the Wetzel grid was described by Robert Deisher, M. D., director of the Child Health Center of the University of Washington. The program was undertaken in collaboration with the State Department of Health.

Dr. Deisher pointed out that "poor growth, but not its cause, can be diagnosed by the use of the grid." It is, he said, merely another tool for screening of children which will, when used properly, increase the number of children who can be selected as needing more intensive study.

Unified Approach Works

The value of a unified approach by the doctor, nurse, social worker, educator, and psychologist in mental health studies was emphasized before the American School Health Association by Mrs. Alice O'Sullivan, psychological tester for the Denver public schools.

Where there is no psychiatric team within the school system and no State and local mental hygiene clinics, psychological assistance can be found in group tests administered by classroom teachers or other qualified personnel.

The way the teacher feels about a child and the degree of comfort in working with children are of prime concern. A detailed personality study can relieve the teacher of the fear that she is at fault in not being able to understand or handle a deviant child. It is good for her to realize that until all the pieces of the puzzle—physical, mental, emotional, home, school, and community—are fitted together, true understanding is not possible.

Dental Programs

"We must insist upon an increasing number of cooperative dental health programs in our schools which can function to educate the students in the basic principles of dental health," William L. Barnum, D. M. D., supervisor of the dental health division of Portland (Oreg.) public schools, maintained before the dental health, health officers, and school health sections.

Describing the Portland program, Dr. Barnum emphasized the value of a specialized dental program worker—the dental counselor—whose duties are distinct and differentiated from those of the hygienist and the school dentist. Instead of an examination procedure, he said, preference has been given to an educational visual inspection program. This calls for an inspection

report to the parent, a referral examination-completion form to the dentist, and a cumulative history record maintained for each student.

Mental Health Interest

A world-wide interest has developed in the importance of mental health, C. Morley Sellery, M. D., director, health services branch, Los Angeles city schools, said in his talk to the dental health, health officers, and school health sections. Another development is the increased interest in the handicapped child. The medical profession, Dr. Sellery stated, has a special contribution to make in the education and guidance of the handicapped child.

EDUCATION

Goals Must Be Clear to Pupils and Teachers

Education will have meaning, purpose, and direction when teachers and pupils work together for clear understanding of what they are trying to achieve, the school health section heard from Bernice Moss, Ed. D., associate professor of health education, University of Utah.

She pointed out that "the modern concept of evaluation in education conceives it as an integral part of the on-going educative process. Evaluation is no longer thought of in terms of tests, check lists, or surveys alone, but rather as a continuously recurring process involving the formulation of objectives, their definition in terms of hoped-for outcomes, study and observation of pupils to determine their progress toward desired goals, and re-examination of the purposes and procedures of the educative process in terms of the results obtained."

Summer Workshops

"Pilot health programs" and the workshop summer courses for teachers in Arkansas have been producing results, Frances C. Rothert, M. D., of the division of maternal and child health, of the State Board of Health, told the school health section.

Enthusiasm for school health programs by local communities has been evidenced by the formation of health committees and councils, she reported. Enrollment by in-service teachers has increased.

Partially Seeing Children

The "cooperative" plan of educating partially seeing children is the most acceptable of the four distinct teaching patterns for these children now used in America, Marjorie A. C. Young, consultant in education, National Society for the Prevention of Blindness, New York, explained to her organization.

The partially seeing child is retained in the regular classroom, which he leaves only for such close eye work as cannot be done without danger of fatigue or discomfort. This arrangement emphasizes the child's assets and minimizes his handicap, thus removing the danger of stigma resulting from special class segregation, Miss Young said.

FOREIGN

Child Needs Security in School as Well as Home

The importance of promoting mental health through school health programs was emphasized by John Greenwood Wilson, M. D., D. P. H., medical officer of health, city and port of Cardiff, Great Britain, and school medical officer of the Cardiff Education Authority, in his talk to a joint session of school health, public health nursing, dental health, and food and nutrition sections.

"We accept the stress and importance of security in the home background of the developing infant and child," Dr. Wilson noted, "but are apt to forget that after infancy an increasing proportion of the child's time is spent out of the home, notably in the school. Have we done as much to try and secure a stable, secure background for the child in the school as we have done in the home?"

Although many social problems affecting the mental health of the school child are outside the scope of the school authorities, the schools may ameliorate their effects through social workers.

School Health in United Kingdom

School health services in England and the United States are concerned with the health of approximately one-fifth of the school-age population and "many children have received appropriate care because of the examination and follow-up programs," C. C. Wilson, M. D., professor of education and public health at Yale, told the school health section.

Reporting on a recent visit to Great Britain, he pointed out that essential differences are in administration and in treatment. England has a national program whereas the United States has 48 different programs. England places the responsibility to secure or provide treatment on schools; here, this responsibility is generally placed in the hands of parents, or of organizations providing for the care of needy individuals of all ages.

Dr. Wilson noted that these differences are related partly to different national and State governmental patterns, and partly to differences in medical practice, public health procedures, and educational philosophies. "No need exists for one country to imitate the other," he said, "but each needs to find better ways, if possible, to coordinate medical, educational, and public health interests in furthering the health improvement of children."

Child Care Changing

"The old system where pregnancy and the care of the child are governed by traditions is now being replaced by a new one of rigid adherence to instructions laid down by medical and nursing experts," Dugald Baird, M. D., professor of obstetrics, University of Aberdeen, Scotland, said, before the food and nutrition, maternal and child health, and public health nursing sections.

Laboratory Developments

ANTIBIOTICS

E. coli Infant Diarrhea Responds to New Drugs

Aureomycin, chloromycetin, and terramycin may prove invaluable in the control and management of infantile diarrhea epidemics, which have a mortality rate of 50 percent at present, the laboratory section heard from Erwin Neter, M. D., Charles R. Webb, M. D., Clare N. Shumway, M. D., and Miriam R. Murdock, B. S., of the departments of bacteriology and pediatrics of the Children's Hospital and the University of Buffalo School of Medicine.

They reported that two serotypes of *Escherichia coli* (0111 and 055) have been recovered from the feces, nasopharnyx, and throat of sporadic cases of infantile diarrhea. Their epidemiological, clinical, and bacteriological data, Dr. Neter and colleagues felt, indicate that contact with and multiplication of these types of *E. coli* may be followed by an attack of diarrhea, suggesting that these organisms may be considered a cause of the disease.

All strains of these serotyes tested were susceptible *in vitro* to chloromycetin, aureomycin, and terramycin, they said. Aureomycin administered orally in doses of 50 to 70 mg. per kilogram per 24-hour period in five infants eradicate the disease in 4 days; terramycin produced identical results in two infants with similar doses. Chloromycetin intramuscularly in smaller dosage worked with one infant in 3 days; injectable chloromycetin, 150 mg. per kilogram for each 24-hour period, was administered to one patient for 7 days with suppression of *E. coli*, they reported.

Granuloma inguinale

Once a problem of considerable stature in the South, granuloma inguinale has declined to such an extent since the introduction of the newer antibiotics that during the past year it has been difficult to find patients for further study and teaching purposes, stated Robert B. Greenblatt, M. D., and William E. Barfield, M. D., both of the Medical College of Georgia, at the venereal disease control section of the Western Branch.

Brucellosis

Negative spleen cultures and no agglutinins for *Brucella* were found in 90 percent of a group of 18 guinea pigs treated with terramycin after experimental infection with *Brucella abortus* (Huddleson's strain 1336), according to Charles M. Carpenter, M. D., Sidney J. Klein, Ph. D., Eric L. Nelson, Ph. D., Bruce E. Rawlings, B. S., and Clinton E. Tempereau, M. D., of the department of infectious diseases of the University of California School of Medicine and the Long Beach Veterans Administration Hospital.

Prevalence of PPLO

Pleuropneumonia-like organisms (PPLO) are more prevalent in humans than was originally thought, Harold E. Morton, Sc. D., and Paul F. Smith, Ph. D., of the department of microbiology of the University of Pennsylvania School of Medicine and of Merck & Co. reported to the laboratory section. The organisms were isolated from 10 to 67 percent of patients with various illnesses, they said.

The organisms have strong resistance to high levels of sulfonamides and penicillin. Out of seven antibiotics tried on in vitro strains, only neomycin, streptomycin, and terramycin completely inhibited all strains, they said.

Terramycin, because of its nonspecificity toward different strains, its nontoxicity, and oral route of administration, seems the best therapeutic agent to use against PPLO infections, Drs. Morton and Smith stated.

NEW TECHNIQUES

In Vitro Test Can Be Used in Diphtheria

With certain precautions the *in vitro* virulence test for *Corynebacterium diphtheriae* can be satisfactorily used in routine diagnostic work, three bacteriologists from the division of laboratories of the California State Department of Health told the laboratory section.

Howard L. Bodily, Ph. D., Thomas F. Cuculich, and Freda Benjamin felt that the test should prove of special value in laboratories where the use of animals presents a difficult problem. While 48 to 72 hours may be necessary for incubation, they pointed out that results can still be reported quicker than the intradermal method because less time is required for incubation of the broth culture than for the Loeffler's culture used in the intradermal procedure.

TB Serologic Test

Preliminary studies indicate that with continued studies of serial specimens a serologic pattern may evolve which will be helpful in determining activity or arrest of the tuberculous process, according to Edgar R. Maillard, M. D., of the Division of Laboratories and Research of the Nassau County Department of Health.

Before the laboratory section, Dr. Maillard described the procedure as a complement-fixation test using red cells of sheep sensitized with old tuberculin and tubercle bacilli.

Serums from 136 patients with clinical and laboratory evidence of tuberculosis were tested. Reactions were obtained from 126. No reactions were obtained from 173 apparently normal persons (all were X-rayed and showed no evidence of infiltrative disease of the lungs). Reaction titers were obtained from 23 of 24 leprosy patients.

Universal Technique

In the study of characteristic serologic patterns in certain diseases, in irradiation, and following injections, it is necessary to employ the complete universal technique, the laboratory section heard from Reuben L. Kahn, D. Sc., of the Serology Laboratory at the University of Michigan.

"In the study of the effect of therapy in various diseases," Dr. Kahn said, "the degree of serologic reactivity to lipids associated with these diseases may be noted by increased or decreased precipitation in the Kahn refrigerated technique. For this purpose, repeated serologic examinations at suitable intervals are essential, as in the case of the complete universal technique."

Typhoid Test

The procedure for the preparation of purified Vi antibody for use in detecting solitary typhoid carriers and carriers in large populations was described by Maurice Landy, Ph. D. and Esther Lamb of the Biologic Products Division, Army Medical Service Graduate School, Washington, to the laboratory section.

The antigen, highly purified, is absorbed on type O erythrocytes, which then become specifically agglutinable by Vi antiserums, and has the advantages of high potency, specificity, and stability.

The hemagglutination test, as described by these researchers, possesses greater sensitivity than the bacterial agglutination test and offers certain advantages with regard to antigenic stability, potency, and uniformity.

Salmonella *Types*

Reporting to the laboratory section, on *Salmonella* types occurring in California from 1944 to 1950, Alcor S. Browne, Ph. D., Howard L. Bodily, Ph. D., Adrienne Williams, M. S., and John F. Kessel, Ph. D., of the State Department of Health laboratories and the University of Southern California School of Medicine, said 59 types had been isolated from 1,391 humans.

"While many of these individuals were hospitalized patients, it should be noted," they said, "that others were asymptomatic carriers. Sufficient numbers of *Salmonella* strains were isolated from the blood stream and from deep-seated processes to recommend the more frequent use of blood cultures early in suspected enteric infections." Several of the strains were reported from humans for the first time.

Treponema pallidum *Life Cycle*

Accurate information on the life cycle of *T. pallidum* is impossible to obtain as no one has succeeded in isolating a virulent culture, Ruth A. Boak, M. D., of the School of Medicine of the University of California reported to the venereal disease control section.

Wherever successful isolation of *T. pallidum* has been reported, investigators were unable to prove the spirochetes virulent, she said.

Host Resistance to TB

Probing for biochemical patterns which might be correlated with differences in the native resistance of animal species to tuberculosis did not reveal any striking species differences, according to George T. Lewis, Ph. D., Lillian Hankey, B. A., Foster Adair, M. S., and Martin M.

Rapid blood test for diagnosis of Trichinosis
Brucellosis
Tularemia
Filariasis
and other Bacterial
and Parasitic Diseases
preparation of extract
Bentonite sensitized with extract of antigen to be employed
Sensitized Bentonite
Then stained—add 1 drop of sensitized test antigen to 1/10th millimeter of serum dilution
the test
Sensitized Particles—Patient's

Demonstration of the technique of the new rapid flocculation test for the diagnosis of trichinosis was part of the Public Health Service exhibit-demonstration at the San Francisco meeting of the American Public Health Association. The originator of the test, John Bozicevich, of the National Microbiological Institute, is shown here. The test was described first in *Public Health Reports* of June 22, 1951.

Cummings, M. D., of Emory University, the Veterans Administration Hospital, and the Tuberculosis Research Laboratory at Chamblee, Ga.

The investigators used lungs, livers, and spleens, because these organs represent a range of susceptibility to the invading organism, and employed rats, rabbits, and guinea pigs as test animals because of their resistance ranges. Amino nitrogen, total nitrogen, and the beta-hydroxy amino acid fraction were studied after normal values were determined.

Q Fever Studies

Antibodies to *Coxiella burnetii* were no more frequently encountered in syphilitic serums than in nonsyphilitic serums, although false-positive complement fixation for syphilis was observed in 32 (7.5 percent) of 427 ill individuals in whom antibodies to *Coxiella burnetii* were present, the laboratory section heard from Edwin E. Lennette, M. D., W. H. Clark, M. D., and Florence Jenson, A. B., of the California State Department of Public Health.

Discussing the interrelationships of the serologic tests for brucellosis, syphilis, and Q fever, they reported that definitive diagnosis of Q fever had been made in all but 2 of the 32 patients in whom false-positive tests for syphilis were observed. In the case of brucellosis and Q fever, difficulties in specific diagnosis due to anamnestic or nonspecific reactions were rarely encountered.

Shigella sonnei *Phase I*

Shigella sonnei is of clinical importance only when it occurs in phase I, according to experimental indications reported by Sara E. Brenham, M. D., principal bacteriologist of the biologics control laboratory of the National Microbiological Institute.

Cultures from 20 carrier strains yielded at least 80 percent of phase II colonies, she told the laboratory section. For 55 strains from clinical cases, the yield was more than 80 percent of phase I colonies and 25 cultures yielded 100 percent phase I colonies.

APHA Conference Report to be Continued in February Issue.

PHS publications

Head Nurse Activities In a General Hospital

This study came about as a result of a request to the Division of Nursing Resources, Public Health Service, from the Massachusetts General Hospital for "an analysis of the head nurse functions to see what can be done to relieve the head nurse either by reallocation of duties or by adding personnel to the ward staff to reduce the demands made upon her."

The study deals with the activities of five head nurse units for 5 days. Its aim is to determine what the activities of the head nurse are, how the nurse's time is distributed among her responsibilities, how much is devoted to non-head-nurse duties, whether any of these duties could be performed by other staff members, and how much additional time would be needed by each other category of personnel to perform them.

. . .

Olson, Apollonia Frances, and Tibbitts, Helen G.: Head Nurse Activities in a General Hospital. Public Health Monograph No. 3 (Public Health Service Publication No. 107.) 1952, 19 pages. Tables. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 25 cents.

Environment and Health

This is the first book in the Public Health Service's 154-year history dealing comprehensively with environmental health, based on the modern concept of health as not simply freedom from suffering but the positive enjoyment of life in wholesome surroundings. The volume is subtitled: "Problems of environmental health in the United States and the Public Health Service programs which aid States and communities in their efforts to solve such problems."

The areas covered are: control of water and air pollution, food and milk sanitation, pest control, health and safety at home, refuse control, school and rural environments, sanitation of interstate public transportation, industrial health, radiological health, administrative problems, and research.

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Environment and Health. (Public Health Service Publication No. 84.) 1951, 152 pages. Illustrations. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., 75 cents.

Industrial Health and Medical Programs

To facilitate the work of agencies and individuals whose concern is the development, administration, and improvement of health and medical programs for industrial workers, the Division of Industrial Hygiene has made this compilation from 260 books and publications of material on industrial health and medical programs.

The text, which consists entirely of direct quotations, provides background information about industry, the working population, the health of the worker, and the historical developments in the field of industrial health. It describes plant health and medical services and health and medical programs for industrial workers. Considerable data have been taken from several nation-wide surveys of general interest. Statistical data are used wherever available. The book contains no information on the clinical aspects of occupational medicine or the technical aspects of industrial hygiene engineering and chemistry.

. . .

Klem, Margaret C., McKiever, Margaret F., and Lear, Walter J.: Industrial Health and Medical Programs. (Public Health Service Publication No. 15.) 1951, 397 pages. From the Superintendent of Documents, Government Printing Office, Washington 25, D. C., $1.00.

U. S. GOVERNMENT PRINTING OFFICE: 1952

I am happy to extend to Public Health Reports the best wishes of the Federal Security Agency. In consolidating several of its publications, the Public Health Service has taken a real step forward in the direction of economical and efficient management.

It is, as well, a recognition of the broadening concept of public health that is characteristic of our times.

Oscar R. Ewing

FEDERAL SECURITY ADMINISTRATOR

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